

IMPERIAL BUREAU OF ANIMAL HEALTH

THE VETERINARY BULLETIN

Vol. 2.]

July, 1932.

[No. 7.]

DISEASES CAUSED BY BACTERIA AND FUNGI.

SANDIFORD, B. R., & WOOLDRIDGE, W. R. (1931). "**Resting**" Bacteria.—*Biochem. J.* **25**. 2172-2180. 3 graphs, 2 tables. [10 refs.]

The authors have investigated what is meant by the term "resting" bacteria. They show that emulsions of "resting" bacteria contain both living and dead cells and that enzymic activity is not solely dependent upon the living cell, but appears to be a property both of cells which are unable to grow, even given suitable conditions, and of living cells which are prevented from growing by the experimental conditions. They recommend that the use of the term "resting" bacteria be discontinued or else limited to washed bacterial suspensions in which growth is inhibited during the period of observation, such suspensions containing both living and dead cells. They note that the addition of methylene blue to the substrate is followed by a temporary increase in the viable count and that the subsequent fall is much slower than where the dye is absent. In the absence of the dye, the number of viable organisms steadily decreases. Two possible explanations of this phenomenon are considered. A full description is given of the technique employed.

H. LAMONT.

FARRELL, M. A., & THOMAS, S. (1932). **Metabolic Studies of Streptococci**.—*J. Infect. Dis.* **50**. 134-142. 3 tables. [12 refs.]

It was found that the non-hæmolytic *S. rheumaticus* Allen (Lister strain) could not be successfully cultivated in either USCHINSKY'S, LONG'S or KOSER'S synthetic media which supply nitrogen in the form of one or more of the following substances:—ammonium salts, asparagine and uric acid. Nor was cultivation successful when the commoner carbohydrates or amino-acids were added separately or in various combinations. Rhamnose and xylose, dextrose, lævulose and galactose, lactose, inulin, mannitol and sorbitol, and salicin were the carbohydrates tested; the amino-acids were tryptophan, tyrosine, phenylalanine, histidine, alanine (α), glycine, cystine, glutamic acid and leucine. In contrast, milk aminoids supported growth well.

Rhamnose, lævulose or galactose, however, enabled growth to be obtained to the third subculture.

Certain amino-acids permitted survival of the inoculum for four weeks or longer whilst others were definitely antagonistic. There was some evidence that dextrose lessened this action. It is suggested that in the isolation and purification of amino-acids there occurs a loss of some metabolite essential to the growth of the streptococcus, or of one or more mineral substances which act as catalysts.

A. W. STABLEFORTH.

MINETT, F. C., STABLEFORTH, A. W., & EDWARDS, S. J. (1932). **Studies on Bovine Mastitis. V. The more Acute Forms of Streptococcus Mastitis.**—*J. Comp. Path. & Therap.* **45**. 1-10. 5 charts. [24 refs.]

In this paper a brief critical account is given of the views of various authors who have investigated streptococcus mastitis in its clinical and bacteriological aspects. In the past in distinguishing the different forms of this disease there has been a certain amount of confusion, either because distinctions were based on clinical observations alone, or because for one reason or another bacteriological enquiry was insufficient. In order to obviate such confusion it is necessary to study the bacteriology of the streptococcus affections of the udder and to consider the results in the light of clinical and epizootiological data. In the work now reported an attempt has been made to fulfil these requirements.

The main purpose of the article is to stress the existence of a form of streptococcus mastitis which runs an acute or sub-acute course and which is to be distinguished from the widely prevalent and well-recognised chronic variety. The bacteriological and serological characters of the streptococci associated with this more acute condition are to be dealt with in succeeding papers, but it is mentioned that the organisms differ in important respects from the streptococci (commonly referred to as *Streptococcus agalactiae*) which can be isolated from chronic mastitis. An instance is described of a machine-milked herd, containing 55 and finally 113 cows, nearly all between 3 or 4 years of age, in which 24 cases of this more acute form occurred within 2 years. An account is given of the clinical features of these cases, 12 being of such severity that the affected quarter was partially or completely destroyed. With such animals there was a permanent reduction in milk yield estimated to range from 7 to 11 pounds daily, or one-fifth to one-third of the supply. The effect of this condition upon the milk yield is illustrated in 5 charts which accompany the article. During the 2 years' period, frequent cultural examination of milk samples failed to reveal any cows affected with chronic streptococcus mastitis, and for this reason mainly the herd was of quite exceptional value for the particular purpose in view. Eight cases of the more acute form were also seen in 8 hand-milked herds. The disease appeared to arise spontaneously and there was no obvious relationship to breed, age, stage of lactation or season of the year.

F. C. MINETT.

FRASER, F. H., & ROSS, M. A. (1932). **The Effect of Streptococcal Toxin on Chinchilla Rabbits.**—*Brit. J. Exp. Path.* **13**. 51-59. 3 tables, 4 charts. [11 refs.]

The toxin was obtained by growing streptococcus Dochez N.Y. 5 for 48 hours in 1 or 5 per cent. infusion broth and precipitating with glacial acetic acid or

acetone. It was injected intravenously, the dose varying from 0.1 c.c. to 2.5 c.c. per kg. body weight. In the case of the acetone preparation, one or more groups of 30 animals were used for each dose.

It is concluded that the individual susceptibility of chinchilla rabbits to intravenous injection of streptococcal toxin can be determined from the slope of the curve obtained by plotting the percentage mortality against the dose. Curves are given for three preparations of toxin. The accuracy obtained is believed to be intermediate between that of lethal titrations of diphtheria toxin and of dysentery toxin, and to be such that in 95 per cent. of trials it permits the differentiation of two toxins whose relative potency is 2 : 3, by the use of 30 animals for each toxin. Toxin precipitated by acetone showed no evidence of deterioration after storage for three months at 9°C.

A. W. STABLEFORTH.

HANNE, R. (1931). Notiz über einen schwarzen Farbstoffbildenden Mikrokokkus (*Micrococcus niger* n. sp.). [A Note on a *Micrococcus* producing a Black Pigment (*Micrococcus niger* n. sp.)].—*Zlb. Bakt. I. (Orig.)*. 122. 328-329.

During an investigation of the air of farm buildings, the author found a non-pathogenic, gram-positive, aerobic micrococcus which grew and survived best at about 22°C. and which, on all media tested, elaborated a black pigment which was soluble in water. The name *Micrococcus niger* is suggested.

A. W. STABLEFORTH.

MIESSNER, H., & SCHOOP, G. (1932). Mastitis infectiosa ovis. [Contagious Ovine Mastitis].—*Deuts. tierärztl. Wschr.* 40. 69-75. 3 tables, 6 figs. [37 refs.]

In 23 out of 27 cases of mastitis in 8 flocks of sheep a small gram-negative, non-motile bacterium with rounded ends was isolated; it was similar to that first described by DAMMANN and FREESE and the name *Bact. mastiditis* (Dammann and Freese) is suggested. In 17 cases it was in pure culture, in 4 cases associated with micrococci and in 2 cases with *Bact. pyogenes*. Three cases showed micrococci only and one case *Bact. pyogenes*.

Mastitis was reproduced artificially with *Bact. mastiditis* in one lactating ewe. An attempt to set up the condition in one non-lactating ewe was not successful.

The best flocks were most frequently attacked and the disease recurred yearly. The incidence was 15 per cent. or higher. Primiparae were notably susceptible.

The attack occurred usually several weeks after parturition; the mortality was high and, even in case of recovery, the gland became functionless. Only one half of the udder was affected; it was greatly enlarged, bright red, firm and painful. The histological characters are discussed. The presence of micrococci as secondary agents, or alone, led to gangrene. For purposes of control, affected and convalescent animals were isolated.

Mice were the only laboratory animals susceptible to this bacterium, and were protected by dead cultures.

In 1931, 800 ewes on 4 farms were vaccinated. After one or two injections isolated cases still occurred but after three injections protection appeared to be complete. No controls could be included but the decrease in the number of affected ewes was at least 70 per cent. as compared with previous years.

Bact. mastiditis was also not uncommonly a cause of pneumonia in lambs.

A. W. STABLEFORTH.

COGHILL, R. D. (1931). **The Nucleic Acid of the Timothy Bacillus.**—*J. Biol. Chem.* **90**. 57-63. [13 refs.]

The author found that, while the elementary analysis of the nucleic acid of the timothy bacillus showed it to be approximately identical with that of the tubercle bacillus, hydrolysis showed differences in that the timothy nucleic acid contained at least 20 per cent. of pentose, but no thymine. He therefore considers timothy bacillus nucleic acid to be a plant type sharply differentiated from the animal type obtained from the tubercle bacillus. Such estimations, in his opinion, offer a possible means of classifying bacteria by chemical methods.

NORMAN HOLE.

BORQUIST, M., & ROWE, C. (1931). **The Phagocytosis of Tubercle Bacilli by Leucocytes.**—*Amer. Rev. Tuberc.* **24**. 172-182. 2 tables. [8 refs.]

Monocytes and clasmatoocytes with ingested tubercle bacilli were studied under the following conditions:—(1) on flat preparations, both with neutral red and without stain, kept under continuous observation for periods of from 2 to 11 hours, and (2) on fixed and stained smears of mixtures of cells and bacteria which had been incubated in hanging drops. Monocytes, clasmatoocytes and epithelioid cells with ingested bacteria were studied in smears of lung tissue and peritoneal exudate obtained from tuberculous animals.

There was no evidence that ingested tubercle bacilli were fragmented by any of the cells studied; bacilli inside cells neither took up the neutral red nor appeared to be disintegrated. Epithelioid cells contained many more bacilli than did the other cells, but no greater number of life-cycle changes were seen within them. These experiments suggest the possibility that the longevity of the epithelioid cell, rather than the multiplication in it of bacilli, may account for its greater content of bacilli as compared with the clasmatoocyte.

J. R. M. INNES.

MINISTRY OF HEALTH. (1931). **A Memorandum on Bovine Tuberculosis in Man with Special Reference to Infection by Milk.**—*Reps. Publ. Health Med. Subjects.* No. 63. 25 pp. 4 tables. London: H. M. Stat. Office. [6d.]

This memorandum has a preface by the Chief Medical Officer of the Ministry of Health.

There are seven chapters, of which the first two deal with the incidence of human tuberculosis in England and Wales and the proportion of cases attributable to bovine infection respectively. In the latter, it is stated that this estimate is a difficult matter, but at the same time it is assumed that the discovery of bacilli of the human or bovine type in any given case of tuberculosis provides a fairly accurate indication of the origin of the infection since, in the opinion of the most experienced workers, the possibility of gradual modification of the bacilli of the bovine type in the human body towards the human type is so remote as to be negligible.

A further chapter deals with the incidence of the disease in cattle as ascertained by (1) the tuberculin test; (2) abattoir statistics, and (3) clinical cases detected by routine veterinary inspection; finally, in the fourth part, it is stated that in all probability the estimates of the proportion of cattle suffering from tuberculosis as given by M'FADYEAN in 1921 (30 to 40 per cent.) are moderate and that the real proportion is much higher.

Tuberculous milk and methods of controlling infection are subsequently dealt with at length in two other chapters, one of which includes paragraphs on the subjects of immunisation with BCG, routine clinical examination of cattle, etc.

The memorandum concludes with a summary, in which one or two important statements appear, as to the present position. It is stated that, while the death rate for non-pulmonary tuberculosis in England and Wales is still high, it is decreasing, the rate for 1911 being twice that of 1929.

Although it is impossible to say what proportion of cases of tuberculosis in human subjects are of bovine origin, it is probable that more than 1,000 children under 15 years of age die annually from this cause.

Finally, the opinion is expressed that, while the campaign in favour of clean raw milk must be regarded as of great potential value, the official grading of milk constitutes an important element in any comprehensive scheme for the improvement of the milk supply.

G. W. DUNKIN.

- I. PINNER, M. (1931). **The Relation between Allergy and Immunity in Tuberculosis.**—*Amer. Rev. Tuberc.* **23**, 175-182.
- II. SCHWARTZ, W. S., & HEISE, F. H. (1931). **Variations in Tuberculin Sensitiveness in Tuberculosis Patients.**—*Ibid.* **24**, 479-481. 2 tables.

I. This is a lengthy discussion on the relationship of allergy and immunity. The author considers that they really represent the view-point of two different types of observer, and that the existence of either can only be ascertained by subjecting the organism in question to a reaction with a specific agent. He suggests that the word immunity could be eliminated from clinical usage and that it might tend to the more careful study of the influence of allergy on pathological processes. By this means it may become possible to decide whether a high or low degree of allergy influences resorption, calcification or fibrosis. At present, the word immunity is used as a cloak to cover varying conditions of a non-normal animal.

II. It was not possible to ascertain the factors governing changing sensitivity to tuberculin during the progress of tuberculous infection. Repeated intracutaneous tests gave no conclusive evidence regarding the state or condition of the tubercular lesion. A single intracutaneous test, if positive, reveals only a previous infection with tubercle bacilli.

R. LOVELL.

- I. KRAUS, R. (1931). Kritische Bemerkungen über die von Bruno Lange angestellten Untersuchungen zur Klärung der Ursache der im Anschluss an Calmette-Schutzimpfungen in Lübeck. [**Criticism of Bruno Lange's Investigations of the Source of the Illness in connection with BCG Vaccination of Infants at Lübeck**].—*Zeitschr. Tuberk.* **61**, 113-118.
- II. CALMETTE, A. (1931). Erwiderung auf den Artikel von R. Kraus "Kritische Bemerkungen zu Bruno Langes Untersuchungen über die Ursache der Lübecker Sterbefälle und über B.C.G." [**Reply to the above**].—*Ibid.* 188-190.

I. Kraus is of the opinion that by its nature BCG is open to a partial return of virulence, and that in view of the facts existent it is not necessary to suppose

an exchange of cultures at Lübeck. He does not accept LANGE's conclusion from his investigations that the pathogenic strains isolated at Lübeck could be identified with the human strain "Kiel."

II. In reply Calmette cites the unanimous statement of the expert committee of the League of Nations in 1928 : that BCG is not capable of producing progressive transferable tuberculosis ; that guinea pig inoculation has always shown the same spontaneously healing lesions ; and that its antigenic properties have remained unaltered for ten years.

A. W. STABLEFORTH.

- I. NASTA, M., JOVIN, I., & BLECHMANN, M. (1931). Absence de toxicité du filtrate et de la culture de BCG pour le Cobaye soumis à l'action des rayons X. [The Absence of Toxicity of a Filtrate of BCG Culture for the Guinea Pig subjected to the Action of X-rays].—*G. R. Soc. Biol. Paris*. 108. 1277-1278. [3 refs.]
- II. MOREAU, J., & TORTORELLA, A. (1931). Essais d'exaltation de la virulence du BCG chez le Cobaye infecté par *Streptococcus caviae*. [Experiments to enhance the Virulence of BCG in Guinea Pigs infected with *Streptococcus caviae*].—*Ibid.* 717-718.
- III. NINNI, C., & TRAMONTANO, V. (1931). Réaction tissulaire générale par l'inoculation de BCG dans les ganglions lymphatiques des Cobayes. [General Tissue Reaction by the Inoculation of BCG into the Lymphatic Glands of Guinea Pigs].—*Ibid.* 106. 65-67. [1 ref.]

I. The authors conclude from experiments on 18 guinea pigs that a culture or filtrate of BCG inoculated into guinea pigs exposed to the action of X-rays gives no evidence of toxicity comparable to that observed when filtrates of pathogenic tubercle bacilli are inoculated into irradiated animals.

II. The authors inoculated guinea pigs with the streptococcus with which HORMAECHE and MACKINNON had claimed to be able to enhance the virulence of BCG. The test guinea pigs were also inoculated with cultures of BCG. Although later examination of them showed abscess formation and lesions in which acid-fast bacilli were found, passage of the pathological material failed to produce any evidence of enhancement of the virulence of BCG. These results coincide with those of NÉLIS and SAENZ.

III. The tissue reactions of guinea pigs inoculated into the lymphatic glands with cultures of BCG have been studied. Three phases of the reaction have been recognised : first the local reaction characterised by the non-specific stimulation of polynuclear cells followed by the appearance of epithelioid cells and lymphocytes, a reaction which is considered to be specific ; later (15th to 100th day), the local reaction is shown by the presence of epithelioid and of some giant cells ; a large number of lymphocytes are also found in such organs as the liver, spleen and lungs during this period. Still later the local reaction changes to a fibrosis. It is concluded that immunization with BCG is in some way connected with these histological changes.

R. LOVELL.

- SAENZ, A. (1932). La culture du B.C.G. contient-elle des éléments bacillaires virulents ? [Does BCG contain Virulent Bacilli ?]—*G. R. Soc. Biol. Paris*. 109. 99-101.

MOUSSU, G. (1932). Vaccination anti-tuberculeuse par B.C.G. Le B.C.G. peut-il reprendre de la virulence? [**Anti-Tuberculosis Vaccination with BCG. Can BCG re-acquire Virulence?**].—*Rec. Méd. vét.* **108**. 5-11. [4 refs.]

Saenz carried out a series of experiments to ascertain if BCG vaccine contained any virulent bacilli. Six guinea pigs which were given 600 mg. of BCG subcutaneously revealed no lesions of tuberculosis when autopsied between the fourth and fifteenth months after inoculation.

A second group of five guinea pigs was inoculated subcutaneously with 700 mg. of a BCG culture which had been grown for 64 successive passages on glycerine potato, without the addition of bile. These guinea pigs, when autopsied at varying intervals from the eleventh day to the fourteenth month, showed no lesions of tuberculosis.

Two other groups of guinea pigs were similarly inoculated with different strains of BCG and in no instance was any tuberculous lesion observed.

In all, thirteen strains of BCG were tested and not the slightest evidence was found that any of them contained virulent bacilli and, furthermore, none of the strains appears to have undergone any modification during recent years.

Moussu is of the opinion that BCG can regain its original virulence, but the evidence he brings forward in support of this contention is slight and unconvincing.

T. M. DOYLE.

I. SAENZ, A. (1931). Sur la culture de BCG en profondeur dans le bouillon. [**Deep Broth Cultures of BCG**].—*G. R. Soc. Biol. Paris*. **108**. 854-856. [1 ref.]

II. SAENZ, A. (1931). **Deep Broth Cultures of BCG**.—*Lancet*. **221**. 1406.

I. DREYER and VOLLUM [see this *Bulletin*. **1**. 103.] claim that, by culturing BCG in the depth of ordinary veal broth (pH 6.8), they have succeeded from the second passage in restoring its original virulence for the guinea pig and rabbit.

Saenz has repeated this work using the same technique. Four guinea pigs were inoculated with BCG of the second passage in deep broth culture; two guinea pigs received 5 mg. subcutaneously and two received 2 mg. intraperitoneally.

On autopsy one of the guinea pigs inoculated subcutaneously revealed nothing abnormal, and one inoculated intraperitoneally showed only slight thickening of the omentum. Of the remaining two guinea pigs, one was kept alive and gained in weight; the other died from intercurrent disease.

Guinea pigs and rabbits inoculated subcutaneously and intravenously, respectively, with BCG from the fourth subculture in deep broth showed on autopsy no evidence of any tuberculous infection.

Subcultures, on Löwenstein's and Hohn's egg media, made from each passage of the BCG in the deep broth, demonstrated that the organism gradually loses its vitality by this method of cultivation and that, in less than three months, some subcultures fail to grow.

Saenz concludes that his results are in complete contradiction to those claimed by DREYER and VOLLUM, both as to the ability of BCG to vegetate in relative anaërobiosis or to re-acquire its virulence by this method of cultivation.

II. This is a verbatim translation into English of the same note.

T. M. DOYLE.

DAVESNE. (1931). *Maladie de Bang—de sa prémunition*. [Bang's Disease—Premunition].—*Bull. Soc. vét. prat.* 15. 41.

ROGER. (1931). *Au sujet de la prémunition par injection de bacilles vivants dans l'avortement épizootique à Br. abortus*. [On Premunition against Epizootic Abortion due to *Brucella abortus* by injection of Living Organisms].—*Ibid.* 44.

PARENT. (1934). *De la prémunition par bacilles vivants dans la maladie de Bang chez les tres jeunes génisses*. [On Premunition against Bang's Disease in very Young Heifers].—*Ibid.* 105.

Davesne notes a lack of controls, but concludes from the results obtained in 37 infected herds that injection with living culture is usually effective.

Roger summarises the more important reports dealing with the use of living culture and also giving a précis of replies received in answer to enquiries sent to workers in Switzerland, Denmark and Belgium, and to ten practitioners in France. He concludes that the injection of living culture is to be recommended, because it reduces the number of abortions to a low figure and consequently the chief means of spread. In his opinion the evidence does not point to any increase in the degree of infection of the milk supply.

Parent reviews the report of BUCK (Washington) on the satisfactory results of injection of living culture in very young heifers.

A. W. STABLEFORTH.

FITCH, C. P., BISHOP, L., & BOYD, W. L. (1932). *Report of Further Work on the Relation of Bact. abortus Bang to Fistula and Poll-evil of Horses*.—*J. Amer. Vet. Med. Ass.* 80. 69-79. 4 tables. [6 refs.]

Brucella agglutinins were found at a titre of at least 1 : 100 in 48 of 61 sera (76 per cent.) from different horses affected with fistula or poll-evil. In 32 cases the titre was 1 : 1,000 or higher. Heating the sera to 56°C. for 30 minutes did not materially alter the agglutinin content. *Brucella* were isolated from 7 out of 31 specimens of pus and, by the use of dyes, were shown to be of either the bovine or porcine type. In contrast to most normal horses, 3 which had shown no evidence of disease maintained an agglutination titre of about 1 : 100 for 2 years.

It was not possible to produce fistula or poll-evil artificially except by direct injection into the neck ligament.

A. W. STABLEFORTH.

DUBOIS, C. (1931). *La gravité économique de a mélitococcie ovine et les dangers de sa transmission à l'homme*. [The Economic Importance of *Brucella* Infection of Sheep and the Danger of its Transmission to Man].—*Rev. gén. Méd. vét.* 40. 585-600. 2 tables. [5 refs.]

It is pointed out that *brucella* infection of sheep is accompanied by abortion, but that the majority of ewes do not abort more than once; some abort twice and, exceptionally, there are more than two abortions. This is well shown in tables; in the case of one flock, 31 per cent. aborted in the first year, 10 per cent. in the second year and none in the third year. It would appear that a number of ewes which have never aborted may be infected and therefore be a source of infection to man. The cause of the diminution of abortions is stated not to be due to immunity, but to a state of "premunition" which appears to be a condition preventing the generalization of the bacteria and expulsion of the foetus. [This seems to

be based on the assumption that immunity is always of the so-called "solid" type, and not a relative state depending on many factors such as prolonged exposure, dosage, etc.] It is argued that artificial immunization is not worth while because of the number of ewes which only abort once and thereby attain the state of "premunion." Unfortunately, some of the ewes are sterile for varying periods and, in addition, there is a loss from lambs born dead or in such a poor state of health that they die during the first few days.

The question of replacement of sheep in infected herds is discussed. First, the selling of ewes which have aborted is to rid oneself of sheep which may be in the state of "premunion"; on the other hand they may be sterile. If sold into other herds they may constitute fresh centres of infection; if sold to the butcher they may be dangerous to those who handle the carcass. It is pointed out that the introduction of ewes from a non-infected into an infected area will almost certainly be followed by abortion unless steps are taken to isolate newly bought sheep, a measure which is largely impracticable when dealing with small flocks.

R. LOVELL.

ANANAIÐÉS, B., & MIAOULIS, N. (1931). L'avortement épizootique des brebis en Grèce. [Epizootic Abortion of Ewes in Greece].—*Rev. gén. Méd. vét.* 40. 721-726. [5 refs.]

A description of the clinical and etiological characters of an epizootic of abortion which occurred in ewes in Greece. On one occasion, 50 per cent. of abortion was seen in a flock of 400 sheep and this epizootic attacked only young, newly-imported ewes between the ages of two and four years. In the two-year-old ewes the percentage of abortion was 75. The attack appeared to be influenced by cold and dampness and was most marked in those flocks which were infected with liver fluke. The authors have satisfied themselves that the cause of the outbreak was passage infection and it is supposed to have been contracted from infected pastures on which cows and goats, known to have been infected, had been grazing.

The act of abortion usually took place at the fourth month of gestation and was followed by a profuse diarrhoea. Some of the expelled fetuses were decomposed. The diagnosis was arrived at by the agglutination test and supported by artificial cultivation of the organism. It was found that the serum of normal ewes did not agglutinate *Brucella abortus* in a dilution higher than 1:50, whereas that from infected ewes agglutinated dilutions of 1:100 to 1:1,000. The organism was isolated from the foetus, but maternal blood was sterile. Lesions said to be typical were occasioned in guinea pigs, and the passage organism was pathogenic for pregnant ewes.

G. W. DUNKIN.

I. PRATT, V. E., & GOLD, T. N. (1932). Hæmorrhagic Septicæmia?—*Vet. Rec.* 12. 130-132.

II. TWEED, W. (1932). Hæmorrhagic Septicæmia in Bovines.—*Vet. Rec.* 12. 185-186.

I. Pratt and Gold describe an outbreak of disease among cattle which they consider was caused by a bipolar organism. They believe that infection was introduced either by contaminated hay or by a bull which had recently been purchased.

II. Tweed refers to the controversy which has been carried on during recent years as to whether true hæmorrhagic septicæmia occurs in Britain as some observers have asserted.

He points out that the difference of opinion is mainly the result of faulty nomenclature caused by referring to *Pasteurella bovisseptica* as the *B. septicæmia hæmorrhagica* (HUEPPE, 1886).

Tweed states that the strain of *Pasteurella bovisseptica* which occurs in Britain is generally of low virulence and that infection is usually localised in one organ, but that true hæmorrhagic septicæmia does occasionally occur.

He gives a detailed description of the symptoms and lesions of the acute and chronic forms of pasteurellosis.

T. M. DOYLE.

- I. PERMAR, H. H., & MACLACHLAN, W. W. G. (1931). **Tularemia Pneumonia.**—*Amer. J. Path.* 7. 551. [Abstract of a paper given at the Thirty-first Annual Meeting of the American Association of Pathologists & Bacteriologists, Cleveland, Ohio. 2nd and 3rd April, 1931.]

- II. KIRKWOOD, T. (1931). **Tularemia from the Fox Squirrel.**—*J. Amer. Med. Ass.* 96. 941-942.

I. A brief description of the histopathology of a fatal case of tularæmia in the human subject. The clinical course had been characterised by extreme toxicity and death occurred on the seventeenth day. The necropsy revealed a diffuse pneumonia of an interstitial and alveolar type with miliary necrotic nodules in the interstitial tissue. The alveolar exudate showed a tendency to necrosis. The condition was essentially not a broncho-pneumonia.

II. A report of a case of tularæmia in a woman contracted from a fox squirrel. Two days after skinning and dressing the squirrel, she developed an illness which lasted for four weeks. Headache and nausea were apparent; later a papule, which afterwards ulcerated, developed on one finger; this was associated with enlarged, painful axillary glands. Agglutinins for *B. tularensis* were evident in her blood serum by the seventeenth day.

Cases are accumulating which show that infection of human beings with tularæmia may be traced to "tree squirrels" and attention is drawn to the possible danger to those who kill and dress these animals.

R. LOVELL.

- COMBIESCO, D., STAMATESCO, S., & SORU, E. (1930). Etude sur les substances solubles spécifiques des bacilles du groupe des Salmonelloses. [**A Study of the Soluble Specific Substances of the Salmonella Group of Bacteria.**]—*Arch. roumaines Path. exp. Microbiol.* 3. 189-207. 8 figs., 5 tables. [9 refs.]

The authors have studied chemically and serologically the carbohydrates obtained from cultures of *Bact. aertrycke*, *Bact. paratyphosum* B and *Bact. enteritidis* (Gärtner's bacillus). They claim to be able to distinguish the three substances spectroscopically. The substances were not toxic for guinea pigs, neither was any shock experienced in guinea pigs passively immunized with immune serum. Precipitation experiments with the specific sera were positive. The authors also showed that two fractions were present in each substance as cross absorption experiments revealed the presence of a specific and a non-specific fraction. They also claim that it was possible by absorption with the specific substance to reduce

the agglutinating power of a serum. [The two fractions obtained are rather confusing and, as no details are given of the state of the bacteria, one is led to wonder whether there was any evidence of partial roughness which would account for the common factor between *Bact. aertrycke* and *Bact. enteritidis*. Similar substances prepared by the same method—the acid method of WHITE (1931). *J. Path. Bact.* **34**, 325.—failed in his hands to absorb appreciably “O” agglutinins. These authors, however, do not state what was the type of agglutination with which they were dealing].

R. LOVELL.

MÜLLER, M. (1931). Uebertragung latenter Paratyphusinfektionen bei Schweinen auf den Menschen durch Genuss rohen Schinkens. [**Transmission of latent Paratyphoid Infections of Swine to Human Beings by Raw Ham**].—*Deuts. Schlachthof Zeitung*, **31**, 114-115.

The author discusses a number of cases of illness in human beings in Switzerland after the ingestion of raw salted ham from pigs which were killed when suffering from swine fever. He considers that paratyphoid infection, secondary to the swine fever, was the cause of the human illnesses. The ham was sold in conditions which evaded the existing law of the country.

J. E.

OLITSKY, P. K., KNUTTI, R. E., & TYLER, J. R. (1931). **Studies on the Filtrability of *Bacterium granulosis***.—*J. Exp. Med.* **54**, 557-565. 3 tables. [15 refs.]

Out of 20 monkeys inoculated with filtrates of trachomatous material, one contracted a trachomatous conjunctivitis; out of 16 controls given unfiltered material, nine developed the infection. Cultures of *B. granulosis* were obtained from six of the eight samples of tissue used (the positive filtrate inoculation was made from tissue which failed to yield a culture), but no success was achieved with filtrate (Berkefeld V candles) sown into leptospira media tubes.

It was found possible to filter four out of ten strains of *B. granulosis* through Berkefeld V filters, but they did not pass through Berkefeld N candles; cultures were obtained from the filtrates in tubes of leptospira media. The results were, however, irregular and no pathogenic strain of the organism was successfully filtered. Filtrates of pathogenic strains of *B. granulosis*, from which cultures could not be grown, were not pathogenic when inoculated into monkeys.

In the author's opinion, the available evidence indicates that the etiological agent in trachoma is not filtrable. The property of filtrability alone would not justify the inclusion of the agent in the ultramicroscopic group.

NORMAN HOLE.

VAN HEELSBERGEN, T. (1931). Ein interessanter Fall von Heilung bei Rauschbrand. [**An Interesting Case of Recovery from Blackleg**].—*Berl. tierärztl. Wschr.* **47**, 424.

The author describes a case of blackleg in a calf which was treated by the owner with ungt. laurianum. The muscular necrosis remained localised and healing occurred after further surgical treatment. Blackleg bacilli were isolated from necrotic muscle removed.

J. E.

B

NEEFS & GILLAIN. (1931). Contribution à l'étude de la teigne. [**Contribution to the Study of Ringworm**].—*Ann. Méd. vét.* **76**. 193-209. 3 figs., 2 tables.

Ringworm was discovered in 321 horses at a remount dépôt. Microscopical examination revealed that 248 were affected with *Microsporon equinum*, 27 with *Trichophyton equinum*, 40 with *Achorion gypseum* and 6 were somewhat doubtful. The 3 types of infection are briefly dealt with clinically and microscopically; cultures were prepared to confirm the diagnosis. All the types were pathogenic for the guinea pig by scarification of the skin. *Microsporon equinum* was recovered from the face and forearm and *Trichophyton equinum* from the hand of human attendants of the sick horses. Treatment consisted of the application of iodine.

Each type was inoculated into guinea pigs and positive reactions were observed; after a period, inoculations with the same species gave no reaction. The subsequent immunity appeared to be specific as inoculations of other types produced reactions in such guinea pigs.

A brief description of favus in laboratory rabbits is also given.

R. LOVELL.

DISEASES CAUSED BY PROTOZOAN PARASITES.

PARKIN, B. S. (1931). **A Note on the Diagnosis of Bovine Trypanosomiasis**.—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa*. Part I. pp. 83-86. 4 tables. [1 ref.] Pretoria: Govt. Printer.

The author considers that, in *T. congolense* infection in cattle, blood examination is more valuable than the examination of gland juice, whilst in *T. vivax* infection the reverse is the case.

The results of smear examination were as follows:—

				Positive.	Negative.
<i>T. congolense</i> .	Blood	...	...	131	7
	Gland	...	...	47	76
<i>T. vivax</i> .	Blood	...	...	17	56
	Gland	...	...	53	18

U. F. RICHARDSON.

SCHWETZ, J. (1931). Notes morphologiques sur les Trypanosomoses animales de Stanleyville et du Congo oriental. [**Morphological Notes on Animal Trypanosomiasis in Stanleyville and the Eastern Congo**].—*Ann. de Parasitol.* **9**. 392-422. 10 figs., 4 tables. [8 refs.]

RAO, M. A. N., & AYYAR, L. S. P. (1931). **Some Observations on Trypanosomiasis in Madras Presidency**.—*Ind. Vet. J.* **8**. 111-118. 1 map, 1 chart, 1 fig.

ANDRIEVSKY, P. (1931). Au Sujet des Trypanosomiasis bovines et porcines au Soudan français. [**Trypanosomiasis of Cattle and Swine in the French Soudan**].—*Rec. Méd. vét. exot.* **4**. 84-86. [1 ref.]

The first article records the incidence of *T. vivax*, *T. uniforme* and *T. congolense* in cattle and sheep, of *T. theileri* in cattle, *T. brucei* in sheep, and of *T. congolense* in horses and game. The author draws attention to a long form of *T. congolense* (16 to 20 μ) which is commonly encountered and also points out that, when a mixed infection exists, *T. vivax* may mask *T. congolense*.

The second article deals with the susceptibility of various species of domestic animals to surra and the seasonal incidence of the disease. The author points out that the distribution and incidence of the disease do not correspond with the prevalence of *Tabanus*.

The third article deals with the effect of work, disease and malnutrition on the mortality in trypanosome infections of cattle and swine. The author points out that *T. cazalboni* (*vivax*) appears to be relatively harmless in otherwise healthy indigenous animals, but may cause a heavy mortality under debilitating conditions.

U. F. RICHARDSON.

ADAMS, A. R. D. (1931). **The Action of Various Sera, in vitro, on the Gut and Salivary Gland Forms of *T. rhodesiense* and *T. gambiense* from *Glossina palpalis*.**—*Ann. Trop. Med. Parasitol.* **25**, 299-311. 7 tables. [4 refs.]

Specimens of *G. palpalis* were fed on guinea pigs or monkeys infected by recently isolated strains of *T. rhodesiense* and *T. gambiense*. Suspensions were made from infected guts or salivary glands in citrate-Ringer-glucose solution to which an equal quantity of serum was added.

All fresh sera were rapidly toxic to gut forms of *T. rhodesiense*, but the property was destroyed by heating to 62°C. for 20 minutes. Heating to 48°C. for 20 minutes did not destroy the trypanocidal property. Ammonia also destroyed the trypanolytic property which appears to be due to complement.

The gland forms survived in fresh sera and apparently resisted complement. *T. gambiense* behaved in the same way as *T. rhodesiense*.

Some experiments were carried out which showed that hæmolytic complement was lost in blood within ten minutes of its ingestion by *G. palpalis* and that an extract of midgut is markedly anti-complementary.

U. F. RICHARDSON.

SALLE, A. J. (1931). **The Electrical Behavior of *Leishmania donovani*.**—*J. Infect. Dis.* **49**, 450-454. [29 refs.]

DA CUNHA, A. M. (1931). Diagnostic de la leishmaniose tégumentaire par déviation du complément et intradermo-réaction. [The Diagnosis of Leishmaniasis by the Deviation of the Complement and the Intradermal Reaction].—*C. R. Soc. Biol. Paris*, **108**, 1076-1078.

PAWLOWSKY, E. (1931). Zur Entdeckungsgeschichte der Leishmaniaparasiten. [On the History of the Discovery of *Leishmania*].—*Zlb. Bakt. I. (Orig.)*, **123**, 14-19. 1 fig. [1 ref.]

The first article deals with the behaviour of *L. donovani* under the influence of the electric current. The iso-electric point is between pH 2·10 and pH 3·10. Below pH 2·10 the parasite migrates to the cathode and above pH 3·10 it migrates to the anode.

The second article deals with the use of a suspension of *T. equiperdum* as a diagnostic agent in leishmaniasis. Used as antigen for complement fixation it was unsatisfactory, but when used intradermally it gave local, general and focal reactions in leishmania patients; no reactions were obtained in controls.

The third paper quotes an article by BOROWSKY, a Russian doctor, in the *Militär Medizinisch Zeitschrift* of 1899, which is claimed to be the first published description of the *Leishmania* organism.

U. F. RICHARDSON.

MARCHOUX, E., & CHORINE, V. (1931). Cultures des Spirochètes de la Poule. [The Cultivation of the Spirochætes of the Fowl].—*G. R. Soc. Biol. Paris*. 106. 1125-1128. [2 refs.]

The spirochætes which occur in the blood, and particularly those of the fowl, are difficult to cultivate artificially and although the medium containing coagulated white of egg which was introduced by GALLOWAY marked a considerable advance on those previously employed, it has not entirely solved the problem.

Marchaux and Chorine repeated GALLOWAY's experiments and found that, although slight multiplication took place in the primary cultures, no growth occurred in subcultures. They recognise however that GALLOWAY and MATHIS succeeded in obtaining a series of subcultures on this medium.

The addition of a few drops of a 10 per cent. solution of Witte's peptone to the medium had a favourable influence on the growth of the spirochætes and the authors believe that this was brought about by the increased acidity produced by the action of the peptone.

Medium containing rabbit serum appeared to be indispensable for obtaining primary cultures, but after the fourth or fifth passage the type of serum used, whether equine, bovine, or human, appeared to be immaterial.

T. M. DOYLE.

DISEASES CAUSED BY FILTRABLE VIRUSES.

PARTHASARATHI, P. (1931). **Manufacture of Rinderpest Virus.**—*Ind. Vet. J.* 8. 13-21.

Since the introduction in Mysore State of the serum-virus method of immunisation against rinderpest, considerable difficulty has been experienced in obtaining cattle suitable for the production of virus.

In the beginning of the work, bull calves obtained locally or from the Malnad areas of the State were used, but these were found to be unsatisfactory on account of either heavy infection with *Babesia bigeminum* or low susceptibility to rinderpest.

Buffalo calves proved to be more suitable as they could be readily infected with rinderpest and only a small percentage showed piroplasms in the blood.

The author, however, encountered some difficulty in obtaining a sufficient number of buffalo calves which would show good temperature reactions, although they usually exhibited the other typical symptoms of rinderpest.

For virus production, he now uses buffaloes which show a difference in temperature of at least 4°F. between the lowest morning temperature during the incubation period and the maximum temperature during the pyrexial period.

T. M. DOYLE.

I. GALEA, M. (1932). Essai de culture du virus aphteux dans l'encéphale du Cobaye. [Attempts at the Cultivation of the Virus of Foot and Mouth Disease in the Brain of the Guinea Pig].—*G. R. Soc. Biol. Paris*. 109. 19-21. [2 refs.]

- II. GALEA, M., & TZORTZAKIS, N. (1932). Essais d'immunisation anti-aphteuse du cobaye à l'aide d'un virus aphteux saponiné. [**Attempts at the Immunisation of Guinea Pigs against Foot and Mouth Disease by means of the Virus modified by Saponin**].—*Ibid.* 21-23.

I. Six guinea pigs were inoculated intracerebrally with virulent guinea pig serum. Five reacted 72 hours after inoculation and showed generalisation. The sixth guinea pig showed very marked nervous symptoms and paralysis 68 hours after inoculation. It was killed and an emulsion of brain tissue was immediately inoculated intracerebrally into six guinea pigs and intradermally into the pads of four others. Seventy-two hours later, two of the six guinea pigs inoculated intracerebrally showed the same nervous symptoms as the sixth one of the first group, but no lesions of foot and mouth disease. Five successive passages were made with similar results, but no sign of foot and mouth disease was noted in all those inoculated intradermally into the pads. Fourteen days later, all the guinea pigs were inoculated intradermally with virulent foot and mouth disease virus and reacted. Examination of the brain was made for any organism which might have been the cause of the nervous symptoms, but without success. Guinea pigs previously sensitized with cattle serum showed no nervous symptoms when inoculated intracerebrally with virus and reacted with generalisation.

The author concludes that the virus of foot and mouth disease, when inoculated into the brain of guinea pigs, does not multiply appreciably in that situation before generalisation and that it causes no nervous symptoms. He also considers that this mode of infection is as severe as the intradermal route.

II. Four experiments have been carried out to test the immunising value of a virus treated with saponin. The virus and various dilutions of saponin were inoculated under the skin of the abdomen and failed to cause a reaction, whilst the untreated virus was shown to be infective. The guinea pigs which had recovered from the inoculation with virus and saponin were found not to be immune. A solution of saponin was inoculated subcutaneously into the abdomens of ten guinea pigs. Twenty-four hours later, virus was inoculated into the œdematous swelling caused by the saponin and failed to cause a reaction. The author states the virus was quickly destroyed and left no trace of immunity.

NORMAN DOBSON.

- HALL, G. N., & BEATON, W. G. (1931). **The Infectivity of the Blood in artificial and natural Cases of Bovine Pleuro-Pneumonia.**—*J. Comp. Path. & Therap.* 44. 170-179.

Four sets of experiments were carried out. In the first, the author succeeded in transmitting the disease by means of blood inoculation and, in the second, pure cultures of the organism were obtained from the circulating blood in Martin's bouillon. In the third experiment, it was shown that it was generally possible to isolate the organism from the blood stream on the first day of the thermal reaction and when there was a well-marked local reaction. The organism was found to exist in the blood stream until the local reaction commenced to subside and there was a corresponding drop in temperature. In the fourth set of experiments, it was also found that the organism could be obtained from the blood stream in naturally infected animals and that there was infection until the lung lesion became encapsuled. Except when the lung lesion was encapsuled, it was possible to isolate the organism from the spleen and "glands."

G. W. DUNKIN.

HUON, Ernest. (1931). Recherches sur la Variole-Vaccine. [Research on Variola Vaccine].—*Bull. Acad. vét. de France*. 4. 181-217. [34 refs.]

The experiments recorded in this paper were carried out in collaboration with WURTZ and comprised three series :—(a) attempts to infect calves and asses with freshly collected smallpox virus ; (b) the variolisation of bovines by GAUDUCHEAU's method and (c) attempts to infect vaccine producers with smallpox either during the reaction or after the collection of the vaccine. The last of these experiments was suggested to the author by an observation which he made at Marseilles, namely the contraction of smallpox by three Greeks who were actually reacting to vaccination. He has no doubt that the smallpox infection was contracted after the vaccination had been carried out and states that his experiments show that vaccination produces a brief sensitisation to the smallpox virus.

The author details all his experiments at length ; he concludes that all his attempts to transform variola into vaccinia failed and that the two viruses are separate and distinct.

His experience with the human subject and his experiments with animals lead him to think that, while the vaccinia virus does produce a state of sensitisation to the variola virus for a brief period, the immunity to variola produced by the vaccine is completely established by the 15th day.

In the course of the experiments in which the variola virus was passed through monkeys and bovines, some of the latter became infected with variola and recovered. Further experiments were carried out with serum from these animals with a view to determining its value in serum therapy. Monkeys were used and it was clear that the serum had a high prophylactic and curative value.

Dangerous serum reactions were only observed when large doses were given repeatedly, doses much larger than would be necessary for the treatment of the human subject.

A. LESLIE SHEATHER.

ELFORD, W. J., & ANDREWES, C. H. (1932). Filtration of Vaccinia Virus through Gradocol Membranes.—*Brit. J. Exp. Path.* 13. 36-42. 1 chart, 2 tables. [9 refs.]

In view of the confusions in the recorded evidence on the filtrability of vaccinia, the authors have studied the passage of the virus through graded collodion membranes of the type previously described by Elford [(1931). *J. Path. Bact.* 34. 505.]. The virus selected was a testicular strain of LEVADITI's neurovaccine. The infective tissues were made up to an emulsion of 1 to 2½ per cent. with ox-heart broth which was submitted to a preliminary filtration, first through sand and paper pulp, and then through a comparatively permeable collodion membrane. The clear fluid thus obtained was subsequently passed through less permeable membranes of known average pore size. Serial dilutions of the filtrates were tested intradermally on the skin of the rabbit.

It was found that the permeability end point was about 0.25μ, from which it is estimated that the size of the smallest elements is approximately 0.125 to 0.175μ. It was noted that the titre of the material before filtration had a considerable influence on its filtrability : thus virus which was infective in a 1 : 1,000 dilution was held up by a 0.6μ membrane whereas virus active at 1 : 10⁵ passed a 0.3μ membrane. These findings are explained on the ground that the membranes have definite powers of adsorbing virus which is able to pass only when this capacity has been satisfied.

Experiments designed to show the effect of pH on filtrability indicated that the virus filtered more readily on the alkaline side of neutrality, the highest concentration of virus appearing in the pH 8.2 filtrate. Immune serum in a quantity insufficient to neutralise the virus completely had no demonstrable effect on its filtrability.

R. E. GLOVER.

- I. HELL, Henry. (1931). **Post-Vaccination Problems in Swine.**—*J. Amer. Vet. Med. Ass.* **79**, 763-773.
- II. KERNKAMP, H. C. (1932). **Post-Vaccination Troubles of Swine.**—*Vet. Med.* **27**, 16-18, 1 plate.

I. It is probable that the health of the pig at the time of inoculation is the most important factor in the successful application of the serum-virus method of immunisation against hog cholera (swine fever).

The author believes that much of the trouble which was formerly attributed to serum of low potency or weak virus is the result of other conditions as yet imperfectly understood.

While it is generally recognised that bad results are frequently encountered in herds heavily infested with worms or infected with necrotic enteritis (*B. suispestifer* infection), it is also a fact that losses up to 20 per cent. may occur in apparently healthy herds. Hell believes that these losses are caused by inoculating a herd already infected with a low grade swine fever virus.

It is generally admitted that 75 per cent. of the mortality following immunisation is the result of inoculating herds which are not in a normal state of health, and, in these circumstances, he emphasizes the folly of granting permits to farmers, as they have neither the training nor experience necessary for recognising or assessing the many involved factors encountered in this work.

"Putting a live virus in the hands of the untrained man is the greatest outrage ever perpetrated against animal disease control. Why men who stand high in the ranks of the profession should have, in the early days, foisted such a monstrosity upon the live stock industry is beyond comprehension."

The author states that, in investigations of which the results have not yet been published, it has been found that certain strains of *B. suispestifer* when injected simultaneously with swine fever virus will cause death in 60 hours, although neither the organism nor the virus alone are able to cause death.

He believes that the best time to immunise pigs is before they are weaned at about six to eight weeks of age.

II. Kernkamp states that no more satisfactory artificial immunity can be produced against any disease of man or animals than that conferred by the serum-virus method against swine fever when carried out on healthy susceptible pigs aged from 40 to 90 days.

He discusses the adverse effects that intercurrent diseases or sudden climatic changes may have on recently vaccinated pigs.

T. M. DOYLE.

- JACKSON, C. (1931). **The Microscopic Diagnosis of Heartwater : A Preliminary Note on the Value of Intima Smears.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa*. Part I. pp. 161-173. 12 figs. [2 refs.] Pretoria : Govt. Printer.

A rapid and reliable method for the demonstration of rickettsia and the diagnosis of heartwater is described. This consists of the examination of smears

made from the intima of the larger blood vessels. A portion of the vessel is dissected, spread flat upon a board and scraped with a sharp knife. A thick smear is made with the material collected on the knife. It is fixed with absolute alcohol and lightly stained with Giemsa stain. In such smears it is possible to demonstrate rickettsia in practically all cases of heartwater in sheep. Ring, horse-shoe, irregularly shaped and coccoid forms are observed. Some bodies stain a blue colour, others a reddish or violet colour, and individuals may show a dual form of staining. The dual form of staining is seen in the larger bodies, particularly in the ring-shaped ones.

Larger forms are found in smears than in sections, but these are present along with the small coccoid shapes which occur in sections, and it is suggested that a rickettsia may occur in the intima of the larger blood vessels which differs from that found in the capillary endothelium.

To ascertain if rickettsia were present in mesothelium, smears were made from the serous membranes. A few bodies were found, but these may have been scraped from underlying capillaries, and the presence of rickettsia in mesothelium remains uncertain.

Rickettsia are more easily demonstrated in the venous than in the arterial side of the vascular system. For diagnosis in suspected cases, smears should be examined from three or four sites, preferably the jugular vein or one of its two radicles, the right atrium, posterior *vena cava* and the left side of the heart.

A. D. McEWEN.

HURST, E. W. (1932). **The Effects of the Injection of Normal Brain Emulsion into Rabbits, with Special Reference to the Aetiology of the Paralytic Accidents of Antirabic Treatment.**—*J. Hyg. Cambridge*. 32. 33-44. [35 refs.]

The occasional occurrence of "paralytic accidents" during the course of antirabic inoculation is well recognised as an unfortunate complication of that therapeutic measure. These accidents are not related to the date or to the severity of the original injury, but are associated with the commencement of the treatment; they usually occur within 7 to 23 days of the first inoculation and fatal cases show no rabies virus in the nervous structures.

The findings give definite confirmation of the alleged toxicity of normal brain substance as manifested by the wasting and death which follow the parenteral inoculation of normal foreign brain emulsions into rabbits. In a few cases paralyzes occur, but similar nervous symptoms have been encountered in other work not involving the use of brain emulsions.

The author is unable to explain the reason for the paralysis or to indicate its cause, but the fact that no lesions are discoverable in the central nervous system distinguishes the experimental condition from many of the cases of paralytic accident in which lesions of a very different nature have been described. There is insufficient evidence to warrant the view that the paralytic accidents of antirabic treatment are directly due to the foreign nervous substances injected.

NORMAN DOBSON.

SEIFRIED, O. (1931). **Histopathology of Infectious Laryngotracheitis in Chickens.**—*J. Exp. Med.* 54. 817-826. 1 text fig. 7 figs. on 2 plates. [13 refs.]

Other workers have dealt with the symptoms, gross pathological findings and aetiology of this condition, which is now known to be caused by a filtrable virus. This paper concerns the histopathology of the disease.

The material consisted of 30 cases of laryngotracheitis of which 14 were experimental and 16 were spontaneous cases. Some birds were killed between 6 hours and 7 days after inoculation, while others died in various stages of the disease.

The characteristic lesions were ordinarily restricted to the respiratory tract and were most pronounced in the larynx or trachea; sometimes the eyelids were affected. A certain percentage of the cases were associated with bronchitis, pneumonia and hæmorrhage in the lungs. The involvement of the nasal passages, communicating sinuses and eyes, was dependent upon the mode of infection and upon the course of the disease. The virus affected the epithelial cells primarily, but the predominant picture was œdema and cellular infiltration of the submucosa and hæmorrhage around the small vessels of the submucosa. Retrogressive changes followed at a later stage and the mucous membrane became covered by an exudate in which fibrin could seldom be demonstrated. The characteristic intranuclear inclusions, which were observed in the epithelial cells of the trachea in many cases, showed a close resemblance to those occurring in herpes varicella, virus III of rabbits and in submaxillary gland disease of guinea pigs.

J. R. M. INNES.

DISEASES CAUSED BY METAZOAN PARASITES.

— (1931). **Report of the Proceedings of the Helminthological Society of Washington.**—*J. Parasitol.* **18.** 44-56.

During the 135th, 136th, 137th, 138th and 139th meetings of this society, the following interesting points were raised :—

H. B. RAFFENSPERGER reported the finding of two immature *Stephanurus dentatus* in the lumbar region of the vertebral canal of a pig which had not, however, shown symptoms of paralysis.

W. H. WRIGHT gave some data obtained from experiments with halogenated hydrocarbons in dogs infested with ascarids and hookworms and tentatively concluded that the water-solubility of the compound is of greater importance than the kind of halogen atom in the hydrocarbon molecule.

L. A. SPINDLER reported some observations on the viability of the eggs and larvae of *Stephanurus dentatus* which suggest that mud wallows are not the dangerous places which they have hitherto been thought, but that the larvae develop most successfully and survive longest (for 65 days) under the heaps of litter and rubbish which may be lying about the pig pens.

B. SCHWARTZ and J. T. LUCKER reported the successful infestation of pigs with *Gongylonema scutatum* originally obtained from the sheep. One young pig received about 60 larvae and was found at *post-mortem* examination three months later to harbour 58 mature worms, situated for the most part in the tongue. Another pig received three infected cockroaches, *Blattella germanica*, and at *post-mortem* examination was found to have developed 207 mature worms; 100 of these were found in the tongue and the remainder in the œsophagus.

MYRNA JONES reported the finding of larval cestodes under the gizzard lining of a shoveller duck, *Spatula chlypeata*.

J. E. ALICATA reported the finding of larvae of *Physocephalus sexalatus* in the bat, *Eptesicus fuscus*, the mature worms being recovered through the experimental feeding of a pig.

E. B. CRAM reported the experimental infection of the turkey with *Tetrameres americana* and *Strongyloides avium* neither of which had previously been known to occur in that host.

A report was also made by this worker of an interesting comparison between parasites occurring in the ruffed grouse from the interior of Labrador, away from all contact with domestic poultry, and of parasites of the same host in Massachusetts. A marked difference was shown suggesting domestic poultry to be the origin of the parasites which are common to both ruffed grouse and poultry.

This author also reported a successful experimental infection of *Anas platyrhynchos domestica* with *Amidostomum anseris* from a goose.

J. W. SCOTT recorded the occurrence of a new variety of *Strigea falconis* in the turkey and proposed the name *S.f. meleagris*.

W. T. HOFFMAN reported the finding of seven *Fasciola hepatica* in the pancreas of an aged ram after doses of carbon tetrachloride had freed the liver of infection.

E. W. PRICE reported the occurrence of trematodes of the genus *Amphimerus* in the liver of a turkey.

E. B. CRAM described an experiment in which it was shown that *Blattella germanica* was an intermediate host for *Tetrameres americana*.

J. T. LUCKER reported *Gongylonema neoplasticum* in wild rats in the United States, this being the first record in that country.

E. W. PRICE reported the finding of *Apophallus donicus* (a parasite of dogs and cats) in wild rats in Washington D.C.

This author also presented a note by himself with B. G. CHITWOOD. During a recent campaign of rat extermination in Washington, 100 specimens (*Rattus norvegicus*) were examined for parasites, a list of which is given. Three of the rats were found to be infected with *Trichinella spiralis*, one in the muscle and two in the intestine.

G. DIKMANS and M. S. SKINKER reported the finding of a cysticercus resembling *G. ovis* in the leg muscle of a mule deer, *Odocoileus hemionus hemionus*. The occurrence of *Eucoleus aerophilus* in the trachea of the cat was also reported by DIKMANS, this being the second record of its occurrence in this host in the United States.

E. L. TAYLOR.

FAIRLEY, N. H. (1932). **The Skin Test and Complement Fixation Reactions in Filariasis.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* 25. 220-221.

The skin test was carried out on four patients, 0.25 c.c. of a 0.1 per cent. saline extract of *Dirofilaria immitis* powder being injected intradermally into the skin of the arm. The reaction is regarded as positive when a rapidly extending wheal develops, attaining a diameter of 2.4 cm., roughly the size of a shilling. The reaction is essentially of a group kind and swellings having a diameter of up to 2.0 cm. not infrequently develop in non-filarial cases. It has been shown that patients harbouring intestinal parasites do not react; on the other hand, natives from endemic areas often give positive results when filariae are apparently absent, the presumption being that they are old cases in which spontaneous recovery has occurred.

An alcoholic extract of powdered *Dirofilaria immitis* is employed for the complement fixation test and the author used sera showing various grades of positive reaction for the purposes of the demonstration. All cases of *Loa loa* infestation have so far given strongly positive reactions; only a few cases of active

Filaria bancrofti have been tested, usually with positive results, but by the time elephantiasis due to this worm has developed, the blood test has become negative.

E. L. TAYLOR.

DISEASES, GENERAL.

SCHALK, A. F. (1931). **Sweet Clover Disease in Farm Livestock.**—*Vet. Med.* **26.** 517-520.

Sweet clover hay when fed to animals, chiefly calves, sometimes causes serious losses, the affected animals bleeding to death. The nature and mode of formation of the harmful constituent in the hay is unknown and there is no indication of its harmfulness until the affected animals begin to bleed. Hæmorrhages occur in all parts of the body, commonly in the limbs where large swellings develop: death follows within a few days after the onset of symptoms. Affected cattle subjected to operations (such as castration or dehorning) are liable to bleed to death.

In actual practice, it has been found that, if rabbits and cattle are fed simultaneously on hay, the former begin to bleed some days before the latter become affected; the cattle can then be saved in time by appropriate treatment. Toxic hay kills rabbits in from 6 to 15 days and, if rabbits fed on suspected hay survive for 18 days, it can be assumed that the hay is safe.

18 days is the minimum time in which cattle fed on sweet clover hay have been observed to become affected, but the average time is much longer (up to 90 days). If the blood is examined, a decrease in prothrombin can be observed some days before bleeding begins. Horses are not affected by eating hay which is harmful to cattle, nor are sheep naturally susceptible, but they may be artificially affected by forced feeding with toxic hay.

Among numerous substances tested for curative properties, defibrinated cattle blood, given intravenously in amounts up to one litre, effected a speedy cure even in animals too weak to move. Blood can be drawn, defibrinated, filtered and injected into the affected animal on any farm (i.e. without laboratory aid). The use of toxic hay must of course always be discontinued.

As a useful test of the danger of any particular hay the author states that, if blood from an animal fed on it takes more than 20 minutes to coagulate in a test tube, the hay is to be suspected: if the blood takes 30 minutes to clot the hay is dangerous. Fresh sweet clover is quite harmless.

J. E.

HANEL, R. (1931). Akute Lymphgefässentzündung (Einschuss) beim Pferd. [**Acute Lymphangitis in the Horse**].—*Münch. tierärztl. Wschr.* **82.** 592-595. 1 fig., 1 chart.

The author discusses the 196 cases of lymphangitis seen in the last 25 years at the surgical clinic of Vienna Veterinary College. All but five of these cases occurred in a hind limb and all appeared to be secondary to the presence of old wounds, chiefly in the neighbourhood of the fetlock joint. Streptococci were found commonly in the lesions of the cases examined. The clinical nature of the condition is described. With regard to aetiology, no reference is made to dietetic causes. [The author does not refer to the common "Monday morning" lymphangitis occurring in horses in England and it is not clear whether the condition he describes is related to it or not. The presence of leg wounds may be purely incidental in many of the cases referred to by the author.]

J. E.

ROBERTSON, W. A. N. (1932). **The Hereditary Character of Sidebone.**—*Vet. Rec.* **12.** 83-90 & 119-129. 19 tables.

This paper purports to show more definitely than heretofore the hereditary nature of sidebone on the sire's side, and also the influence of dams by unsound sires on sound families.

During the eleven years under review (1907-1918), 7,894 horses were examined of which 4,959 were draught animals.

The difficulties encountered by the author, chief of which was the impossibility of obtaining full pedigrees, are referred to in an early part of the paper. The multiplicity of names also presented considerable difficulty and it is stated that "it is quite uncommon to meet with a stallion whose name has not been at least duplicated," and as an example of this it is stated that there are recorded 5 British Oaks, 8 Champions, 10 Lord Clydes, 13 Prince Charlies, etc. In many instances it has, therefore, been impossible to tabulate a particular horse's pedigree since its near ancestor may have been Prince Charlie, but no indication is given as to which of the 13 Prince Charlies is meant.

Fifteen tables indicate the unsoundness in this number of families, and the article concludes with four tables showing unsoundness in breeding lines.

G. W. DUNKIN.

PULLAR, E. K. (1931). **Pyæmic Hepatitis in Sheep.**—*Austral. Vet. J.* **7.** 151-152.

The author records a severe epidemic of a pyæmic hepatitis in sheep caused by a gram-negative bacillus closely related to *B. pseudo-tuberculosis rodentium*. The lesions include caseous nodules in the liver, spleen and regional lymphatic glands. The clinical symptoms are briefly mentioned.

J. R. M. INNES.

BOLTON, C., & BARNARD, W. G. (1931). **The Pathological Occurrences in the Liver in Experimental Venous Stagnation.**—*J. Path. Bact.* **34.** 701-709. 2 figs. on 1 plate. [8 refs.]

This paper is one of a series dealing with the factors responsible for producing the dropsy of venous stagnation. It concerns the histology of the congested liver and the work carried out in order to discover an interpretation of the appearances found in view of the demonstrated changes in the circulation and lymph flow of the organ when in a state of congestion.

Constricting bands were applied to the caudal vena cava in the thorax of cats and the animals were killed after periods varying from 4 to 113 days. Various stages of hepatic congestion, such as occurs in uncompensated heart disease, were thus obtained, including recovery from the effects of the treatment.

Any rise of pressure in the vena cava is transmitted right through the liver from the hepatic to the portal vein, until the pressure is proportional (as if the latter were one continuous tube without any intervening capillaries). This occurs with all degrees of obstruction. In other organs of the portal area, the pressure is merely transmitted back to the capillaries because of the tonic contraction of the arterioles. Obstruction in the splanchnic area is thus followed by a fall of arterial pressure and a lessening of the blood supply to its capillaries. Arterial constriction does not relieve the condition. At this stage, there is considerable stagnation in the liver capillaries with resulting necrosis and cellular

degeneration and increase in the lymph production: the lymph stagnates in the liver, leaking out of the capsule as ascitic fluid. The hepatic and portal veins are dilated and all capillaries are equally distended in the early stages. Later, the latter may dilate irregularly and may rupture owing to lack of support, particularly in those regions under the capsule. Necrosis occurs in the central part of the lobule, extending from one central hepatic vein to another, and is sharply limited. The cell changes are not due to pressure as is popularly supposed, because the cells swell at the beginning and are quite unaffected around the portal venules where capillary pressure is high; also the sharp transition from necrotic to normal cells is not in keeping with this notion. The other organs to which the liver acts as a buffer do not show extensive changes; their capillaries are congested and excessive lymph production leads to dropsical effusion. At a later stage, the blood increases in volume; the pressure goes up in all parts, and the flow of blood through the liver and the lymph flow from its lymphatics are increased; compensation is thus partially effected. A high portal pressure is associated with less severe cellular changes in the liver. If it were possible to raise the portal pressure high enough to ensure normal blood flow through the obstruction, the changes in the liver would be limited to dilatation of the vessels and to a minimal degree of pressure atrophy.

J. R. M. INNES.

DE SANCTIS, A. G., & ALLEN, A. (1931). **Purpura Hemorrhagica. (Thrombocytopenia).**—*Amer. J. Dis. Child.* **41**, 552-567. 2 tables. [23 refs.]

Three cases of thrombocytopenic purpura in boys are recorded. The chief complaint and outstanding symptom was a persistent and uncontrollable nosebleeding. The observations on the blood were typical; marked thrombocytopenia, normal coagulation time, normal bleeding time and non-retractile clot. Splenectomy was performed in each case and the organ showed fibrosis. In two of the three cases there was no recurrence of the bleeding after operation. The rapid destruction of the platelets is due to some factor which activates the reticulo-endothelial system to unusual thrombocytolytic action.

J. R. M. INNES.

ORIEL, G. H. (1931). **Some Observations on the Pathogenesis of Eczema of Internal Origin and other Allergic Diseases.**—*Proc. Roy. Soc. Med.* **24**, 1171-1180. 14 figs., 8 slides.

In this article, the author describes his work on eczema of internal origin and on other allergic reactions. The report is illustrated by means of a youth, who had been affected with eczema from birth and whose father was similarly affected all his life. This youth was sensitive to eggs, fish, wheat and many other foods; a minute quantity of egg albumin rubbed on his skin produced a marked urticarial reaction and he also suffered from asthma.

The author recalls that, in these cases, the specific antigenic substance has been shown to circulate in the blood and that a passive sensitisation can be produced.

He concludes that the antigen must be eliminated either by the kidneys or by the intestinal tract, or else be actually destroyed, e.g. by ferments. Acting on this assumption, he succeeded in demonstrating in the urine a substance which could best be classed as a proteose. Intradermal injection of minute

doses of this proteose into a sensitised person gave a reaction similar to that observed on injection of an antigen to which the patient is sensitised. The author suggests that, if this be consistent, it should be possible to desensitise a patient to his special antigen and he describes a number of experiments performed to prove this hypothesis.

When the uterus of a guinea pig, actively sensitised to a given patient's antigen, was placed in a solution containing the proteose isolated from the same patient's urine, a marked contraction was observed. When proteose was re-applied to the uterus, after it had been washed with Ringer's solution, no contractions were observed. This experiment was considered to demonstrate that the proteose was capable of acting as an antigen and that, when applied to the sensitised uterus, it desensitised the organ. The application of a heterogeneous protein resulted in slight contraction, but left the uterus capable of marked contraction if the original proteose were applied.

Continuing, the author describes similar work which yielded identical results in experiments with the uteri of passively sensitised guinea pigs and also with uteri from guinea pigs sensitised to milk and to the proteose of a milk-sensitive child. In control experiments, such reactions were absent.

These experiments were again repeated and similar results were obtained when the proteose isolated from the urine of cases of asthma, urticaria, migraine, eczema and rheumatoid arthritis was used. In cases of eczema of external origin, negative results were obtained.

Intradermal tests with proteose yielded marked reactions in the specifically sensitised human being.

An aspirin-sensitive case is described in which intradermal tests with proteose or aspirin gave negative results so long as the patient did not take aspirin, but, if aspirin were taken, positive results to both were obtained and the patient's proteose also gave positive reactions in other aspirin-sensitive patients.

Summing up, the author demonstrates the practical importance of the work. The boy first described received doses of his own proteose once a week for a period of 18 months, the result being that he was desensitised to such an extent that, after six months' dosage, his asthma had completely disappeared and the skin condition had considerably improved.

W. NAIRN.

NELSON, J. B., & GOWEN, J. W. (1931). **The Establishment of an Albino Rat Colony free from Middle Ear Disease.**—*J. Exp. Med.* 54. 629-636. 1 fig., 2 tables. [2 refs.]

An attempt has been made to build up a special colony of albino rats, free from middle ear disease, from a population in which the disease was rife. Young rats from a single pair of parents free from middle ear disease and pneumonia constituted the nucleus from which the colony was developed. Although it is possible that the disappearance of middle ear disease from the colony was effected by selection of a chance line of resistant rats, it is considered that this is more likely to be due to a reduction or elimination of the associated bacteria. It was found impossible to eliminate pneumonia in the colony of rats as approximately 50 per cent. of adults showed pneumonic areas. It is believed that middle ear disease and pneumonia of albino rats have no aetiological relationship, particularly as overcrowding or feeding on a vitamin-deficient diet failed to predispose to the development of middle ear disease.

R. LOVELL.

SLYE, M., HOLMES, H. F., & WELLS, H. G. (1931). **Intracranial Neoplasms in Lower Animals. Studies in the Incidence and Inheritability of Spontaneous Tumours in Mice.**—*Amer. J. Cancer*. **15**. 1387-1400. 4 figs. [32 refs.]

A review of the literature indicates that intracranial tumours are rarely observed in the lower animals of any species. Especially noteworthy is the fact that only one seemingly conclusive report of a cerebral glioma in an animal could be found.

In 11,188 mouse brains examined by the authors, only three primary neoplasms were found, namely, an endothelioma of a cerebral peduncle; a papillomatous growth in the ependyma of the lateral ventricle (ependymoma or papillary adenoma) and an infiltrating adenoma of the hypophysis. About half the number of mice examined suffered from some sort of malignant tumour, but in no case was an intracranial metastasis found. In two mice with osteosarcoma of bone with multiple metastases, nodules of the tumour were found in the skull. A case of adenoma of the hypophysis of a parakeet (*Agatornis pullaria*) is also described.

J. R. M. INNES.

FOOT, N. C. (1931). **On the Silver Impregnation of Melanotic Tumors.**—*Amer. J. Path.* **7**. 619-630. 12 figs. on 6 plates. [7 refs.]

[The origin of the pigmented cell in the melanomata has given rise to much controversy and, at the present, there is no unanimity regarding the problems which have rendered these tumours one of the most notable topics in oncology. The main points which still remain in dispute are the histogenesis of the pigmented cells, the mode of origin and distribution of the pigment and the relation of the simple pigmented naevi to malignant transformations. For a complete review of the subject up to 1925 and as a source of reference material, the monograph by DAWSON, J. W. (1925). "Melanomata, their Morphology and Histogenesis." *Edin. Med. J.* **32**. 501. should be consulted. This is the most complete exposition of the subject in the English language; it is profusely illustrated and deals with the historical, developmental, normal, histological, pathological and clinical aspects. Up to the present, four origins have been assigned to the melanoma—skin, endothelium, connective tissue and the tactile corpuscles of Wagner-Meissner. DAWSON [*supra*] derives all varieties of the melanomata from the basal layers of the epidermis. Up to the date of the appearance of his monograph, a neurogenic origin had not been seriously considered.]

That the pigmented naevi of the skin are neurogenic in origin was the theme of an article by SOLDAN (1899). MASSON (1926) came to essentially the same conclusion, but followed this line of argument more carefully and with more convincing proof. According to his views, the naevi are really "neuronaevi, nervous tumours" and represent the lawless overgrowth of the cells associated with the terminal sensory nerves. He considered the melanoblast or Langerhans cells to be specialised members of the same race, specialising in the formation of pigment.

The author of the present paper endeavours to consolidate MASSON's views by the utilisation of improved silver impregnation methods for the demonstration of nerve elements in the pigmented naevi, compared with normal skin and mucosae and malignant neuronaevi or melanoblastoma. The technique is given in detail. The results obtained are considered to confirm MASSON's views which are not discussed in full; for details reference should be made to *Ann. d'Anat. path.* (1926). **3**. 417 & 657.

J. R. M. INNES.

GMINDER, A. (1931). Eine eigenartige in Württemberg beobachtete Mangelkrankheit der Rinder. [A peculiar deficiency Disease observed in Württemberg].—*Arch. wiss. prakt. tierhkl.* **63**, 275-282. 5 figs. [3 refs.]

The author discusses the "Wedener Krankheit"—a chronic disease lasting several months to a year, characterised by lesions of the skin, mouth and nose, and by emaciation—observed in Württemberg in the years 1923 to 1926. The disease is apparently associated with certain soils and seasons, is specifically bovine and does not affect horses, goats, sheep or pigs.

The aetiology is not clear, but the fact that cattle recover on good pastures and respond to treatment with cod-liver oil leads the author to deduce that deficiency of vitamins A and D plays a part in the causation of the disease.

"Lecksucht," a form of pica, was not observed in the cases recorded, but calves may show various psychic disturbances. The disease may be complicated by intercurrent infections and diagnosis so rendered more difficult.

H. H. GREEN.

BOYD, W. (1931). **Milk Fever and Like Conditions.**—*Vet. Med.* **26**, 276-277. [Notes on an Address given at 6th Vet. Conf., Ohio, U.S.A., March, 1931].

WILSON, P. (1931). **Persistent Recumbence after Milk Fever Decubitus.**—*Vet. Rec.* **11**, 406-408. [Read before Scottish Metropol. Div. Nat. Vet. Med. Ass. (Gt. Britain) Edinburgh].

The first of these papers deals with milk fever in a general way, incidentally recording cases falling within the personal experience of the author and responding to calcium therapy.

The second paper deals with decubitus of long duration as sequel to milk fever. Treatment consists in ensuring recovery from the primary disease, followed by measures based upon the general principles applicable to the particular case.

H. H. GREEN.

ASTON, B. C. (1931). **Lime-Deficiency in the King-Country.**—*New Zealand Agric. J.* **43**, 119-124.

A sheep disease in the Mairoa district of New Zealand, locally termed "dopiness," is regarded as due to lack of calcium and phosphorus in the pastures.

Carefully controlled experiments have been initiated to compare the effects of various manurial treatments of the soil upon the composition of the pasture and the health of the sheep. Meanwhile the application of 5 cwt. of lime with 2 cwt. of superphosphate per acre, has prevented the disease and increased the sheep carrying capacity of the pastures.

[It may be noted that, by analogy with mineral deficiency diseases in other parts of the world—see this *Bulletin*, **2**, 168—the temptation would be to regard the Mairoa disease as an aphosphorosis except for the fact that the author specifically states (pp. 121-122) that manuring with superphosphate and basic slag did not prevent the disease although it improved the vegetation, and that it was not until the pasture was dressed with the 5 lime-2 phosphate mixture that the desired result was obtained.

There is here the suggestion of a specific acalcicosis, and a biochemical examination of the blood combined with an accurate clinical and pathological description of the disease from the veterinary standpoint would be of great scientific interest. As in the case of the author's previous work on bush-sickness,

a specific anæmia due to iron deficiency and similar to the Nakurutitis of Kenya [see ORR & HOLM, this *Bulletin*, **1**, 314], the observations in this paper are recorded solely from the point of view of the agricultural chemist.]

H. H. GREEN.

THEILER, A., & GREEN, H. H. (1932). **Aphosphorosis in Ruminants.**—*Nutrition Absts. & Revs.* **1**, 359-385. [150 refs.]

A general review of phosphorus deficiency diseases in cattle and sheep, with occasional reference to other animals and to correlated diseases.

The bibliography covers the more important papers from the earliest records of LE VAILLANT in 1781 up to the most recent publication of THEILER in 1931 [compare also the abstract of 34 papers from Onderstepoort over the years 1919-1931, this *Bulletin*, **2**, 168].

The first part of the paper deals with the consecutive researches from South Africa commencing with the discovery of the cause and means of control of "lamsiekte" (bovine botulism associated with aphosphorosis) and "styfsiekte" (bovine osteomalacia and rickets specifically arising from phosphorus deficiency). "Lamkruis" (fracture of the pelvic bones in ovine aphosphorosis) is also discussed, and the general effects of phosphorus deficiency on development of ruminants, on the reproductive cycle and on economic stock rearing, are dealt with from the veterinary point of view.

The second part of the paper deals with the geographical distribution of aphosphorosis throughout the world and records are discussed from Kenya, India, Ceylon, Australia, New Zealand, Western America, Eastern America, British Guiana, the Mediterranean, Central Europe, Britain, and Scandinavia.

The total acreage of utilisable pasture land over which phosphorus deficiency is the limiting factor in stock nutrition is enormous, and the direct consequences vary from slightly reduced productivity to osteophagia, osteoporosis, rickets, osteomalacia, cachexia and death. The indirect consequences range from the rapidly fatal botulism passing under local names such as "lamsiekte" in South Africa, "loin disease" in Texas, and "Midland disease" in Tasmania, to obscure cases of reduced resistance to parasitic diseases.

The general relationship between the metabolism of phosphorus, calcium, and vitamins is considered. The authors differ from MAREK and WELLMAN [(1931) "Die Rachitis." Berlin: Gustav Fischer] in regard to the significance of mineral balance ["Alkali-alkalinität" and "Erdalkali-alkalinität"].

Many of the more recent papers discussed in the review have already been abstracted in this *Bulletin*.

H. H. GREEN.

- I. SCHWARZ, G. (1931). Angeborene Rachitis. [Inborn Rickets].—*Münch.-tierärztl. Wschr.* **82**, 17-18. 4 figs.
- II. BEČKA, J. (1931). Die Osteomalazie, ihr Entstehen, ihre Prophylaxis und ihre Therapie vom Standpunkte der Biochemie. [The Origin, Prophylaxis and Therapy of Osteomalacia from the Biochemical Standpoint].—*Schweiz. Arch. Tierhkl.* **73**, 173-181. [10 refs.]
- III. KJØLBERG, J. (1931). Osteomalaci og dens behandling. [Osteomalacia and its Treatment].—*Norsk Vet.-tidsskr.* **43**, 123-125.

I. In the first paper the author describes inborn rickets particularly in foals in the Aidenbach district. The nutritional conditions of 1929-1930 are stated to have favoured rickets and cases were observed in calves and pigs.

The photographic reproductions show foals with striking deformations of the legs, which are generally bandy and with much thickened joints. Treatment was attempted with "Kalk-Lebertran Emulsion Bengen" [calcium and cod-liver oil] with successful results in some cases. [It may be noted that cases very similar to those shown in the photographs have been recorded from other parts of the world, but not designated as true rickets, e.g. in South Africa "inborn bandy-legs" is known in horses, mules and donkeys, but the aetiology is regarded as obscure].

II. The second paper is a general article including certain personal observations of the author, who defines osteomalacia as a disturbance of calcium metabolism accompanied by acidosis and due partly to faulty dietary ratio between calcium and magnesium [contrast views of THEILER, A., this *Bulletin*. 1. 313., and 2. 101]. Other factors incriminated by the author are reaction of physiological fluids, balance of ions, the parathyroids, the vitamins, and ultra-violet light.

Successful treatment is reported with Polysan [colloidal magnesium hydroxide] administered parenterally for therapeutic purposes or orally for prophylaxis. The magnesium is supposed to correct the calcium-magnesium imbalance, rectify the acidosis, tone up the vegetative system and mobilise leucocytes.

III. The third paper is even more vague. The author records successful treatment of a bovine osseous disease by iodine therapy [Lugol's solution] a fact which casts some doubt upon the legitimacy of the descriptive term osteomalacia. [No histological evidence is adduced in support of the diagnosis].

H. H. GREEN.

STEYN, D. G. (1931). **Investigations into the Cause of Alopecia (Kaalsiekte) in Kids and Lambs.**—17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa. Part 2. pp. 729-768. 9 figs., 6 tables. [3 refs.] Pretoria: Govt. Printer.

The term "*kaalsiekte*", literally "bald-sickness" or "naked disease," is used by South African farmers to designate a form of alopecia affecting kids and lambs, the outstanding feature of which is extensive loss of natural covering.

Although legendary in the Willowmore and Uniondale districts for over 80 years the disease was first investigated from the veterinary standpoint by VAN RENSBURG in 1925 [official communication to the Director of Veterinary Services]. Owing to the large population of small stock in the areas affected and the heavy losses incurred on some "alopecia farms," the present author carries the investigations further.

He discusses statistical incidence of the disease, conditions affecting its occurrence, morbidity and mortality, symptomatology, *post-mortem* appearances, cause, treatment and prevention.

Details of five experiments are then discussed and a plant toxin is incriminated. In the first experiment 11 out of 13 kids, from goats fed exclusively upon the flowering plant, developed typical alopecia. The main conclusions are:—

(1) *Ghrysocoma tenuifolia* Berg., the so-called "bitterkarroo" or "beesbossie," is the cause of "kaalsiekte" in kids and lambs, and the causal toxin is secreted in the milk of the mothers eating the plant. Alopecia commences a few days after birth.

(2) The disease can be successfully prevented by avoiding "bitterkarroo veld" for a period of 14 days prior to and after kidding or lambing.

(3) The disease occurs in the kids of all breeds of goats and in the lambs of all cross-bred sheep. Cases in Merino lambs are also reported.

(4) When ingested in large quantities, *Chrysocoma tenuifolia* produces abortion in pregnant sheep and goats, as also symptoms of severe gastro-intestinal irritation.

(5) Two four-day old Angora kids, forcibly dosed with considerable amounts daily for 20 days, developed no symptoms of alopecia. This experiment leads the author to suggest either a modification of the plant toxin to the "alopecia toxin" in passing through the mother, or the necessity for action of the toxin for a prescribed period upon the foetus. A third possibility is also discussed—the fact that since the mothers may ingest much larger doses (up to 4 lb. a day of the fresh plant) than the quantities administered to the lambs in experiment, there is the chance that the toxin may reach the lamb in excessive amounts through the milk.

(6) The Colesberg *Chrysocoma tenuifolia* is much more toxic than the Willowmore variety.

(7) In addition to the "alopecia toxin," the plant contains a principle producing diarrhoea, and the relationship between the two substances requires elucidation.

(8) In certain experimental groups receiving potassium iodide in addition to the plant, the proportion of abortions was higher than in those receiving none [reason not clear].

The photographs reproduced in the article show natural cases of alopecia compared with cases produced experimentally. An advanced case (fig. 6) shows loss of coat, diarrhoea, acute purulent conjunctivitis and rhinitis.

In discussing the limited literature available on the subject of alopecia the author refers to the observations of V. A. REKO [(1928). "Der tropische Haarschwund bei Tieren."—*Therap. Monatsh. f. Vet.-Med.* **2**, 76.] on a disease in the Southern States of America, in the course of which horses, mules, cattle, and sheep shed their coats. Stock-owners incriminate "loco-weed" (*Astragalus lambertii*, *Astragalus molissimus*, and *Gystium diphygium*). A similar disease in Mexico is attributed to prolonged ingestion of *Tamarindus indica*. The seeds of this plant have indeed been used to breed the small hairless Chihuahua dogs, but with dubious collateral effects.

The statements of J. C. WARD [(1930). "Thallium Poisoning in Sheep."—*J. Amer. Pharm. Ass.* **19**, 556-559.] regarding the action of thallium salts are also quoted. Used in poisoned grain for control of prairie dogs, accidental ingestion by sheep has caused losses. Apparently sub-lethal doses (9 mg. thallium per kg.) cause alopecia in sheep.

H. H. GREEN.

IMMUNITY.

- I. FELTON, L. D. (1931). **The Correlation of the Protective Value with the Titers of Other Antibodies in Type I Antipneumococcus Serum.**—*J. Immunol.* **21**, 341-356. 2 tables, 4 charts. [8 refs.]
 - II. FELTON, L. D. (1931). **The Use of Ethyl Alcohol as Precipitant in the Concentration of Antipneumococcus Serum.**—*Ibid.* 357-373. 1 table, 6 charts. [15 refs.]
- I. Thirty-nine polyvalent sera from 37 horses immunised against types I and II pneumococci were compared, observations being limited to type I antibodies. After a preliminary estimate of potency, the protective value of each

was measured using 20 to 30 mice for each of five dilutions in arithmetical progression. The virulence of the culture was controlled with one well-known serum. The protective values of the sera varied from half to ten times that of the standard serum. They were correlated with the values obtained by precipitation measured by the smallest amount of whole serum which caused any flocculation of a constant amount of soluble carbohydrate, and also with those obtained by agglutination, neutralisation tests, and the amount of protein in 1 to 4 c.c. of serum precipitable by specific soluble carbohydrate under optimum conditions (HEIDELBERGER'S technique). The correlation was measured by the usual PEARSON manipulation; the coefficient between protection and precipitation was 0.93, between protection and agglutination 0.80, between protection and neutralisation 0.88, and between protection and the amount of protein precipitable by specific carbohydrate 0.91.

The author concludes that mouse protection tests can be replaced, and that the estimation of the amount of protein precipitable by carbohydrate is the method of choice. Accurate and reproducible results can thus be obtained even in sera which are not fresh. It is stated that the applicability of this method to concentrated sera depends on the method of concentration; for if the serum is heated, subjected to extremes of pH, or held for any length of time in a high concentration of salt, precipitability may be decreased without a similar decrease of protective units. The cumbersome water dilution method, or precipitation with alcohol as described in the second paper do not cause this depression of precipitability.

II. It was found that at 0°C. at least 80 per cent. of the protective substance present in serum was precipitated by adding 95 per cent. ethyl alcohol to give a concentration of 15 to 20 per cent. Precipitation with 10 per cent. gave a purer product of which the immune protein formed about 80 per cent., but in order to obtain a greater yield it was necessary to use a higher proportion of alcohol and to remove the water-soluble part. The active material could be dried *in vacuo* without loss of immunological characteristics. An acid precipitable toxic substance was also present, but could be removed without important loss of protective substances. Methyl alcohol and alcohol-ether mixtures caused more denaturing of the protein. Acetone was effective, but 40 per cent. was required.

A. W. STABLEFORTH.

ENDERS, J. F. (1932). **A Note on the Specific Agglutination of Pneumococcus Types I, II and III.**—*J. Exp. Med.* 55. 191-202. 5 tables. [4 refs.]

From a comparison of unabsorbed antisera and antisera which had previously and repeatedly been absorbed with specific soluble carbohydrate, it was shown that type-specific agglutination of suspensions of pneumococcus types I, II and III occurred at about the same titre before and after absorption; the conclusion drawn is that there exists a type-specific agglutinin distinct from the specific carbohydrate. In support of this it is stated that, in contrast to the specific carbohydrate, the agglutinogens responsible for agglutination in such absorbed sera were in the case of types I and II inactivated by heating the suspension adjusted to pH 8.8 at 100°C. for 40 minutes and leaving it for 14 to 16 hours at 37°C. before neutralisation. Similar treatment at pH 5.0 or formalinisation did not cause inactivation.

It is noted that these properties are also those of the type-specific substance A, recently obtained by the author from the autolysate of pneumococcus type I.

It is suggested that sole reliance on agglutination may lead to errors in the estimation of therapeutic efficiency.

A tentative explanation is offered for the failure of pneumococcus type II to absorb the agglutinins from *B. Friedländer*, type B antiserum.

A. W. STABLEFORTH.

- I. VAN LOCHEM, J. J. (1931). Au sujet de l'agglutination par les sérums frais. [**Agglutination by fresh Sera**].—*Ann. Inst. Pasteur*. **46**. 78-79. [3 refs.]
- II. DAVESNE, J., & HABER, P. (1931). Influence de l'hyperthermie sur la production et la variation du taux du pouvoir agglutinant. [**Influence of a High Temperature on the Production and Variation of Agglutinins**].—*G. R. Soc. Biol. Paris*. **108**. 766-768. [5 refs.]
- III. BIER, O. G. (1931). Influence de la concentration en NaCl sur l'optimum d'agglutination. [**The Influence of the Salt Content on Optimal Agglutination**].—*Ibid.* 511-513. [1 ref.]

I. The author refers to the hypotheses of either an optimum concentration of colloids or the existence of a so-called "agglutinoid" to explain the fact that agglutination is not always most marked in tubes containing the greatest quantity of serum. He rejects both hypotheses and states that, in 1907, he had shown that it was due to the presence of complement in the fresh serum. Of two types of bacterial suspensions, the one completely agglutinated did not fix complement as the other was capable of doing.

II. Rabbits were injected intravenously with heated cultures of *Gl. histolyticum*, their serum tested for agglutinins and their temperatures taken. A similar series of rabbits was injected with cultures and β tetrahydro-naphtylamine. The latter substance is not without danger as several rabbits died showing a high temperature previous to death. Although the figures given are not convincing, the authors consider that the titre of an agglutinating serum is higher in an animal which registers a high temperature caused either by the antigen or, in these cases, by the non-specific substance.

III. It has previously been pointed out that, in a series of tubes in which one places a suspension of bacteria and varying quantities of agglutinating sera, agglutination may first occur in one of the middle tubes, thus giving a reaction somewhat similar to the RAMON reaction. Bier has given the results of varying the salt content, and has thus shown that the optimal tube may vary according to the concentration of salt. Several series of tubes were put up in which the bacterial suspension (Flexner dysentery bacillus) was constant, the quantity of agglutinating serum varied from a dilution of 1/20 and each series was diluted in varying concentrations of NaCl from a saturated to a M/20 solution. The optimal tube was not determined in the saturated or half saturated rows because of the rapid agglutination, but the dilution at which it occurred in the other rows varied from 1/320 to 1/640 in the M/1 row to 1/1,280 to 1/2,560 in the M/20 row.

R. LOVELL.

- MOERCH, J. R. (1931). La réaction de Ramon. Propriété floculante de la toxine et de l'antitoxine diphtériques. [**The Ramon Test. Flocculation of Diphtheria Toxin and Antitoxin**].—*G. R. Soc. Biol. Paris*. **108**. 545-548. 1 table.
- MOERCH, J. R. (1931). La réaction de Ramon. Le principe floculant de la toxine diphtérique. [**The Ramon Test. Flocculation Principle of Diphtheria Toxin**].—*Ibid.* 558-561. 3 tables.
- MOERCH, J. R. (1931). Le principe floculant du sérum antidiphtérique. [**The**

Flocculation Principle of Anti-Diphtheria Serum].—*Ibid.* 562-565.

SCHMIDT, S., & JENSEN, C. (1931). Propriétés flocculantes des sérums anti-diphthériques provenant de diverses espèces d'animaux producteurs d'antitoxine. [**Flocculation Principles of Anti-Diphtheria Sera from different Species of Animals producing Antitoxin**].—*Ibid.* 566-569. [1 ref.]

In the first paper, the author considers the fact noticed by many workers that different samples of diphtheria antitoxin react with the same toxin with varying rapidity when tested by the flocculation reaction of RAMON. His second and third papers deal with experiments which indicate that, in filtrates of cultures of both toxic and non-toxic diphtheria bacilli, there exists a substance which is capable of reacting with antitoxin and that this substance is antigenic; the term "floculino-gene" is proposed. It would appear to exist independently of toxin and is partly responsible for flocculation. The author has been able to prepare sera containing the "floculine"—the antibody corresponding to the "floculinogene"—by immunisation of rabbits with the filtrates of non-toxic diphtheria bacilli and this antibody when added to mixtures of toxin and antitoxin exercises a definite effect on the rapidity of flocculation. Moersch is inclined to accept the hypothesis of two antibodies being present in diphtheria antitoxin—the "floculine" and the antitoxin proper.

The fourth paper is concerned with the production of antitoxin in a variety of animals. The authors find that the horse produces sera rich in "floculine"; sheep and goats produce sera poor in "floculine," even if rich in actual antitoxin. The faculty of producing antitoxin is therefore not correlated with the production of "floculine" and they consider that more work should be carried out before deciding whether the two antibodies dealt with by MOERCH are identical or not.

R. LOVELL.

OSBORN, T. W. B. (1931). **A Study of the Factors influencing the Concentration of Complement in the Blood.**—*Biochem. J.* **25**, 2136-2149. 5 tables, 3 figs. [24 refs.]

The author describes the complement concentration in the sera of vitamin A-deficient rats at various stages of the deficiency and compares it with that of normal rats. It was found that the age of the animal had some influence as did the ingestion of food. A method for the estimation of complement is described and during the work it was found that a large source of error was that different samples of sheep's blood differed considerably in the ease with which their corpuscles were hæmolyzed. Each sample, therefore, had to be assayed.

With regard to the effect of age, it was found that there was a marked tendency for the complement to be low in the blood of young rats and, as a result, only rats which had been weaned over four weeks were used.

The effect of irradiation with a mercury vapour lamp was tried and it was found that none of the ten rats used whose diet had been deficient in vitamin A showed a significant rise in complement. Irradiation does on occasions give rise to an increase in complement, but this is not invariably the case.

The author concludes from the experiments performed that there is a marked tendency towards low blood complement when a diet deficient in vitamin A is fed, due either to this deficiency or to some factor, other than vitamin D, occurring in liver oils.

In addition to the above data, a method of estimating hæmolytic complement is described which is stated to have greater accuracy than the method in present use. The text is illustrated by various charts and tables.

G. W. DUNKIN.

HANSSON, H. (1931). Ueber Komplementvariationen des Blutes gesunder und tuberkulös infizierter Meerschweinchen. [**On Variations in the Complement in the Blood of Healthy and Tuberculous Guinea Pigs**].—*Zlb. Bakt. I. (Orig.)*. **123**. 94-102. 12 charts. [4 refs.]

The blood for complement titration was obtained by cardiac puncture twice weekly, 1 c.c. being taken. From certain animals 40 to 60 c.c. were removed in 1 c.c. amounts within four months.

From a comparison of 36 normal guinea pigs and 32 which had been inoculated with ten to sixty million virulent tubercle bacilli of the bovine or human type, the conclusion is reached that, although a smaller or greater increase in the complement may occur both in normal and in inoculated animals, no distinction can be made, but that the increase is to be traced to the frequent bleedings.

A. W. STABLEFORTH.

MEYERS, H. R. (1932). **A Contribution to the Study of the Etiology of Serum Disease.**—*J. Immunol.* **22**. 83-92. 4 tables. [16 refs.]

The author summarizes some of the work carried out to eliminate or reduce the incidence of serum disease following the administration of various therapeutic and prophylactic sera. Special reference is made to the work of KYES and CAREY [(1929) *J. Immunol.* **17**. 529] who claim to have eliminated completely serum shock and serum sickness in their treatment of pneumonia by the use of anti-pneumococcal fowl (Brahma cockerel) serum from which the fibrinogen had been removed. They believe that small quantities of fibrinogen were present in the serum after clotting of the animal's blood and suggest that their method may be applicable to the preparation of immune sera from species other than the fowl. Meyers suggests that the reactions following the injection of cockerel serum are different from the serum sickness sometimes caused by the injection of horse serum. Assuming, however, that fibrinogen may be the cause of the horse serum reactions, he injected human volunteers subcutaneously and intravenously with sterile fibrinogen solutions and no reactions developed. Sera were prepared in rabbits against horse fibrinogen for the detection by the precipitin test of the substance in various samples of therapeutic sera known to produce serum disease. No fibrinogen was detectable and, coupled with his other results, he concludes that "horse serum fibrinogen does not appear to be a responsible etiological agent in the production of serum disease."

R. LOVELL.

BRUSSIN, A. M., & KALAJEV, A. W. (1931). Die Bedeutung des Komplements und der Blutplättchen für die Feststellung der Thrombozytobarine. XXII Mitteilung. [**The Importance of Complement and Bloodplatelets in the Demonstration of Thrombocyto-*barin*. XXII Communication**].—*Zeitschr. Immun.-forsch.* **70**. 497-521. [15 refs.]

MESSIK, K. E. (1931). Zur Frage über normale Thrombozytobarine in Bezug auf Leishmanien. [**The Question of the Presence of Thrombocyto-*barin* to Leishmania in normal Animals**].—*Arch. Schiff- u. Tropen-Hyg.* **35**. 334-336. [6 refs.]

The first article is the latest publication on a series of observations by KRITSCHESKI, TSCHERIKOW, BRUSSIN and their colleagues of the Microbiological Research Institute of Moscow, on the platelet adhesion phenomenon in trypanosomiasis. In its simplest form this phenomenon is shown by the mixing of a suspension of the corresponding trypanosome with the blood of an infected

animal when a congregation of platelets occurs round the trypanosomes. It has been shown that this phenomenon occurs in leishmaniasis, spirochaetosis and also in infections with spirilla and vibrios.

The reaction is highly specific. The phenomenon is due to a heat-resistant antibody (thrombocytobarin) reacting with the corresponding antigen in the presence of complement which is absorbed. It was thought that the red corpuscles interfered with the reaction and later work was done with plasma of infected or recovered animals, cell-free trypanosome suspensions and washed platelets, the latter acting simply as indicators. A good review is given by KRITSCHESKI and TSCHERIKOW [(1925). *Zeitschr. Immun.-forsch.* **42**, 131].

The article under review stresses the importance of the quality and quantity of complement which may be deficient in the plasma of infected animals. Blood platelets of mice were found to be injured by washing and it was found that, if mice were used, citrated blood was required. Citrated guinea pig plasma could be used with washed guinea pig platelets. Complement must be supplied by the same species of animal as that from which the platelets are obtained.

Various bacteria can be used as indicators in place of platelets, but the reaction then loses its specificity.

The inoculation into rats or mice of spirochaetes killed by heat will give rise to the production of thrombocytobarin in the blood.

The second article deals with the question of the existence of normal thrombocytobarin. CHODUKIN, SOFIEFF and BUROWA, working at Usbekistan in Central Asia, reported that 18 out of 55 mice gave positive reactions to leishmania and suggested that this might be due to the attacks of *Phlebotomus*. The author tested 30 mice, 8 dogs and 8 rabbits at Moscow and found that 4 mice gave positive reactions when tested with leishmania, and that 2 mice gave a strong positive reaction with a canine strain of leishmania, but a weak reaction with *L. tropica*. The author, however, cannot accept the suggestion of BUROWA that *L. donovani* and *L. tropica* can be considered to be genetically distinct.

U. F. RICHARDSON.

TRAUM, E., & LINDEN, H. (1931). Beitrag zur Frage der Genese trypanociden Serunkörper beim Menschen an Hand klinischer Beobachtungen. [**Clinical Observations on the Production of Trypanocidal Antibodies in Human Beings**].—*Klin. Wschr.* **10**, 1500-1501. [12 refs.]

NATTAN-LARRIER, L., & NOYER, B. (1931). Voies d'introduction et d'activité des serums anti-trypanocidal. [**The Influence of the Path of Inoculation on the Trypanocidal Action of Sera**].—*C. R. Soc. Biol. Paris.* **108**, 856-859.

LEDENTU, G. (1931). Groupes sanguins et *Trypanosoma gambiense*. [**Blood Groups and Trypanosoma gambiense**].—*Bull. Soc. Path. exot.* **24**, 664-667. 1 table.

The trypanocidal substance in human serum is believed to be produced by the liver, and ROSENTHAL and his colleagues have used the test for this substance as a test for liver disease. Traum and Linden, however, think that the spleen also plays a part and have shown that the substance disappeared in two cases in which splenectomy was performed, but that it reappeared some months later.

Nattan-Larrier and Noyer found that the intravenous injection of immune serum could have a curative effect on mice infected with *T. brucei*, whilst subcutaneous and intraperitoneal injection was practically without effect. If immune

serum were mixed with the homologous organism and inoculated the incubation period was prolonged and death postponed, whatever routes was used, but intravenous inoculation had the most marked effect.

Ledentu tested the curative and protective powers of human sera belonging to the groups II, III and IV, on mice infected by *T. gambiense*. Serum of group II was of greater value than the others, particularly in its protective property. The author points out that in Anglo-Saxons the proportion of people with group II sera is 53 per cent., whilst in Africans it is usually much lower. It may be that races showing peculiar immunity may have non-African ancestors.

U. F. RICHARDSON.

CUMMINS, S. L., & WEATHERALL, C. (1931). **The Retardation of Lytic Processes by Colloidal Silica Solution.**—*Brit. J. Exp. Path.* **12**, 239-244.

Cummins has already shown that colloidal silica completely protects *B. typhosus* from the bactericidal action of fresh human serum and has suggested that it does so by interfering with the action of complement. In further studies of the antibactericidal properties of colloidal silica, Cummins and Weatherall have shown that the addition of colloidal silica solution completely prevents the lysis of *B. typhosus*, *B. coli communis* and *B. dysenteriae* (Flexner) by normal human blood or fresh human serum, but that it has no effect on staphylococci, streptococci and tubercle bacilli which resist the bactericidal action of serum even without the presence of colloidal silica. They have also shown that colloidal silica, if added to a tube of broth inoculated with *B. typhosus*, has no growth-stimulating properties. Extending their observations to lytic processes into which complement does not enter, they found that the presence of silica interferes with lysis of pneumococci by ox bile and with the digestion of coagulated egg white and of blood fibrin by trypsin.

In order to explain the persistence (for years) of dust-cells which are frequently seen in the perivascular and peribronchial lymphatics of silicotic lungs, the authors performed two experiments. Two c.c. of a heavy suspension of silica dust in saline solution were inoculated intraperitoneally into a guinea pig which was killed 24 hours later. A sample of peritoneal fluid was removed and mixed with an equal volume of sodium citrate solution to prevent clotting. Microscopic examination showed many large mononuclear cells containing particles of silica dust. A portion of this suspension was mixed with an equal volume of physiological saline solution (series A) and another portion with an equal volume of colloidal silica solution (series B). These mixtures were incubated in sealed capillary tubes and microscopic examinations were made from time to time during the course of 42 days. It was found that the cells in series B were much better preserved both in appearance and number than those in series A.

In order to prove that this preservative effect was due to the added colloidal silica solution and not to the gradual solution of phagocytosed silica particles, the following experiment was performed. One guinea pig was inoculated intraperitoneally with anthracite dust in saline and another with silica dust. Both guinea pigs were killed 24 hours later; samples of their peritoneal fluid were removed, citrated and put up into capillary tubes in two series, *viz.* with and without added colloidal silica solution. The results obtained proved that it was the added colloidal silica solution which agglutinated, and preserved the cells.

C. Mc G.

WORINGER, P. (1932). Le phénomène de Prausnitz et Küstner est-il dû à une sensibilisation ? [**Is the Phenomenon of Prausnitz and Küstner due to Sensitization ?**].—*C. R. Soc. Biol. Paris*. **109**. 204-206. [1 ref.]

In 1921, Prausnitz and Kustner described a skin reaction phenomenon, If the serum from an allergic subject is injected into the skin of a normal individual and an injection of the corresponding antigen is made 24 hours later, then there follows a reaction at the former site, characterised by whitish œdema surrounded by a red areola, similar to that produced by the injection of the antigen into an allergic subject. An explanation advanced is that this is due to a sensitization of the skin by the allergic serum. Experiments with the quantity of antigen required and the time during which it is possible to produce a reaction have led the author to consider it to be due to the combination of antibody and antigen and to the liberation of a substance, probably of a histamine nature, which provokes œdema and capillary dilatation.

R. LOVELL.

I. MARTINY, M., & PRÉTET, H. (1931). Anaphylaxie par voie digestive ; rapports entre le degré de dilution de l'antigène et le délai nécessaire à la constitution de l'état anaphylactique. [**Anaphylaxis by the Digestive Tract : Association between the Degree of Dilution of the Antigen and the Period necessary to the Anaphylactic State**].—*C. R. Soc. Biol. Paris*. **107**. 12-13. [2 refs.]

II. AÏTOFF, M. (1932). Anaphylaxie par voie digestive ; rapports entre le degré de dilution de l'antigène et le délai nécessaire à la constitution de l'état anaphylactique. [**Anaphylaxis by the Digestive Tract : Association between the Degree of Dilution of the Antigen and the Interval necessary to the Anaphylactic State**].—*Ibid.* 164-165.

I. Two guinea pigs were each given a dilute solution of egg albumen by the digestive tract. The dose appears to be 5 c.c. of a dilution of 10^{-9} . Anaphylactic shocks were claimed to have occurred in one guinea pig when it was given an intracardial injection of egg albumen 24 hours later and, in the other, 48 hours after the preliminary administration of egg albumen. The anaphylactic dose was 0.5 c.c. of a 1 in 100 dilution. The minute sensitizing dose and the short period between its administration and the anaphylactic state are pointed out.

II. The author was unable to confirm the work of MARTINY and PRÉTET who had claimed that they had produced anaphylactic shocks in guinea pigs by giving intracardial injections of egg albumen 24 to 48 hours after receiving a dilute solution by the digestive tract.

R. LOVELL.

PUBLIC HEALTH.

OTTEN. (1931). Die Stellen für Entnahme von Muskelproben bei der bakteriologischen Fleischschau. [**The Places from which to take Sections of Muscles in Bacteriological Meat Inspection**].—*Berl. tierärztl. Wschr.* **47**. 724.

The author criticises various regulations concerning the taking of pieces of muscle from carcasses in the course of examination for the presence of meat-poisoning bacteria.

He makes the following suggestions :—

(1) As a general rule, in all dubious cases of possible infection of the carcass, a section of the muscle should be taken from the post-tibial musculature in order to comply with the law.

(2) In cases where disease of the abdominal organs or hind limbs has been found, the muscle section should be taken from the region of the pubic symphysis (*M. gracilis*) : where disease of the thoracic organs and fore limbs has been found, the muscle section should be taken from the shoulder musculature.

J. E.

LESNÉ, M., & DREYFUS-SÉE, G. (1931). De la sécrétion lactée et du rôle du lait modifié ou pollué après la traite dans le déterminisme de divers états pathologiques. [**On the Lactic Secretion and the Rôle of Milk, modified or polluted after Withdrawal, in determining various Pathological Conditions**].—*2me Congrès internat. Path. comp.* 123-197. [70 refs.]

In the first chapter of this comprehensive review, which as a whole is written from the human viewpoint, the authors discuss variations of the normal constituents of the mammary secretion in members of the same and different species, the occurrence of abnormal elements including toxic substances of bacterial and chemical origin and certain viruses, and the presence of antibodies. The second chapter is given to the pollution with saprophytic and parasitic organisms which may occur after the milk has been drawn. Brief reference only is made to the presence of pathogenic bacteria within the gland itself. In the last chapter the pathogenic effects of these common variations in the normal and abnormal constituents of milk are considered. Under the heading of the therapeutic value of milk, attention is given to its variable vitamin D content. Irradiation of the cow is regarded as useless and, although irradiation of the mother or of the milk is considered by some workers to be of value, the authors favour the administration of suitable doses of a concentrated preparation of vitamin D.

Amongst their conclusions are the following :—

Milk is a balanced food adapted to the nutrition of the particular species for which it was intended and its qualities are maintained even to the detriment of the mother. Raw milk cannot be used without danger for the artificial feeding of infants. The best method of sterilisation is by boiling in large containers for five minutes, or by sterilisation "au Soxhlet" [filtration], because all ferments, antibodies and vitamins are not thus destroyed. [There will not be general agreement in the case of boiling].

It is necessary to create a "better milk policy" with the combined action of medical men, veterinarians, and hygienists, who will watch over the health of the farm personnel, animals and conditions of sterilisation and distribution respectively, and of chemists and bacteriologists who will control the milk before it is delivered for consumption. Propaganda by means of conferences, pamphlets and the cinematograph is advocated.

A. W. STABLEFORTH.

BURROW, H. (1931). **The Bacterial Contamination of Milk and its Significance.**—*Vet. Rec.* **11**, 1295-1302. [7 refs.]

This article deals with both the pathogenic and non-pathogenic organisms which may be found from time to time in milk. The author submits methods whereby contamination by the former may be reduced to a minimum. This

class is again subdivided into two groups, the one consisting of those organisms which are the cause of diseases peculiar to man alone and the other of those organisms which are primarily found in dairy cows, but which are also suspected of being the cause of human ailments. In the former group are typhoid fever, dysentery, diphtheria, scarlet fever, asiatic cholera, septic sore throat and tuberculosis. In the latter are tuberculosis, Bang's disease, mastitis, anthrax, foot and mouth disease, actinomycosis, variola, vaccinia, etc.

The paper was read to the Veterinary Hygiene Section of the Royal Sanitary Institute Congress, held in Glasgow on 10th July, 1931, and was followed by a discussion in which public health officers, as well as veterinary and medical officers, took part.

G. W. DUNKIN.

GRAY, J. D. A. (1932). **The Significance of *Bact. aerogenes* in Water.**—*J. Hyg.* **32**. 132-142. 3 tables. [47 refs.]

Bact. aerogenes has been isolated from human faeces and also from the faeces of the horse, cow, sheep, pig, dog, cat, wild rabbit, wild rat and wild mouse. The organism was much more readily isolated from samples of soil which were not likely to have been contaminated by human or animal faeces. Examination of the water supply of Liverpool shows that the proportion of *Bact. aerogenes* to *Bact. coli* is high and that it tends to increase on storage. Examination of water which had been contaminated with normal faeces showed that the initial proportion of *Bact. aerogenes* to *Bact. coli* is low, but that it is reversed on storage. Faeces containing *Bact. typhosum* or *Bact. paratyphosum* B was added to water, but the pathogenic organisms were isolated only on the first two or three days after storage. The author considers that preponderance of *Bact. aerogenes* over *Bact. coli* in a water supply is indicative either of contact with soil which is not contaminated with fresh faeces or of long-past faecal contamination, and that such a water supply may for practical purposes be regarded as indicative of freedom from such pathogens as *Bact. typhosum* or *Bact. paratyphosum* B.

R. LOVELL.

POISONS AND POISONING.

TATUM, A. L., & SEEVERS, M. H. (1931). **Theories of Drug Addiction.**—*Physiol. Rev.* **11**. 107-121. (53 refs.)

A review of literature selected to illustrate the different theories advanced concerning the mechanism and nature of drug addiction.

The paper is dominantly of medical interest, but since the mechanisms of addiction, tolerance and habituation are fundamentally physiological, and part of the conclusions are based upon experimental work on animals, the theories will also interest those veterinarians concerned with diseases arising from ingestion of plants which have injurious effects, but which stock do not instinctively shun—for example *Astragalus lambertii*, *Astragalus molissimus* commonly known as "loco-weed," *Chrysocoma tenuifolia* of South Africa [see STEYN, this Bulletin. **2**. 392.] and *Tamarindus indica* of Mexico causing alopecia in animals, and *Geigeria passerinoides* causing "vomeersiekte" in sheep.

The authors discuss morphinism in considerable detail. Heroine, codeine, alcohol, cannabis indica, members of the hypnotic group such as chloral hydrate and members of the stimulant group such as strychnine are dealt with, and it is argued that there is a fundamental difference in action in cells of the central

nervous system which respond to drugs by lessened activity and cells which respond by increased activity.

They consider that any valid theory of drug addiction must correlate the following points :—

- (1) Addiction to a drug may occur independently of acquired tolerance.
- (2) Only those drugs to which tolerance is developed produce such profound alterations in the central nervous system as to demand more of the drug to establish functional normality.
- (3) Tolerance appears to be developed only to those drugs which decrease the activity of the cells.
- (4) Increased sensitivity, as contrasted with tolerance, is developed towards those drugs which increase cell activity.
- (5) With drugs which selectively increase the activity of some cells and depress others, sensitivity is developed by the former and tolerance by the latter.
- (6) Demonstrable neuropathological changes occur in all cases of serious drug addiction.
- (7) The difference in rate of destruction and elimination of a drug by the addicted and the non-addicted is not sufficient to account for all the developed tolerance to depressant drugs and sensitivity to stimulant drugs.
- (8) Apart from the central nervous system the addict is organically normal.

H. H. GREEN.

PUGH, C. J. (1932). **Poisonous Plants met with in Country Practice.**—*Vet. Rec.* **12.** 233-236.

A brief account of some of the commoner poisonous plants likely to be encountered in the English countryside.

G. D. LANDER.

STENT, S. M., & LAWRENCE, D. A. (1932). **Poisonous or Suspected Poisonous Plants of Southern Rhodesia.**—*Rhodesia Agric. J.* **29.** 15-20.

Morœa zambesiaca is a species of the blue tulip, related to *M. polystachya*, recorded in Tanganyika and Portuguese East Africa and also in Southern Rhodesia at Salisbury and Marandellas. The plant flowers towards the end of September and fatalities due to its consumption occur earlier in the same month.

The plant is highly toxic, as little as four to five ounces killing a small ox. The incidence, symptoms and *post-mortem* appearances resemble those of the well-known South African "tulip" poisoning.

Trichodesma physaloides belonging to the borage family, and the leguminous *Sphenostylis marginata* and *Crotalaria Rogersii* fell under suspicion, but feeding tests failed to establish their toxicity. It is noted that certain *Crotalaria* species have proved toxic to stock [South Africa and U.S.A.].

G. D. LANDER.

SPECIFIC THERAPY.

KAMINSKY, J., & DAVIDSON, D. L. (1931). **The Effect of Viosterol (Irradiated Ergosterol) on Calcification in Pulmonary Tuberculosis.**—*Amer. Rev. Tuberc.* **24.** 483-487. 1 table. [11 refs.]

Calcium salts have been advocated in the treatment of pulmonary tuberculosis with the view to stimulating calcification and healing of the lesions. The feeding

of massive doses of irradiated ergosterol [vitamin D] to experimental animals causes hypercalcaemia [and/or hyperphosphatæmia and calcareous deposition in kidneys, arteries, alimentary musculature and lungs]. The authors conducted a series of experiments on the treatment of human cases of tuberculosis in order to determine if it were possible to stimulate calcification of the lesions in the lungs by maintaining the circulating calcium at a high level through ingestion of small doses of vitamin D.

A preliminary period of feeding small doses of viosterol to the patients caused a considerable rise in the serum calcium. Observations were then continued on a group of 16 patients (7 advanced cases, 8 moderately advanced and one minimal case) over a period of 3 to 8 months. Roentgenograms were taken before commencement and at the termination of the treatment.

The serum calcium showed a slight increase in all but one case. Roentgenographic study showed a slight increase in calcification in the lung fields of two patients, while the roentgenograms of a third patient which showed considerable calcification before treatment indicated that augmentation of calcification had occurred during the period of treatment. No appreciable change was noted in the remaining 13 patients.

Other workers have observed calcification of tuberculous lesions in rabbits and guinea pigs following the ingestion of massive [toxic] doses of irradiated ergosterol, [but this is also accompanied by the deleterious effects which are associated with abnormal calcification in other organs]. The dosage of irradiated ergosterol, when applied to the study of human pulmonary tuberculosis, must for obvious reasons be kept within therapeutic limits. [A number of cases of hypervitaminosis D in the human subject have been recorded]. It is possible that the failure to cause calcification in these cases was due to the small dosage employed.

J. R. M. INNES.

SRNETZ, Alfred. (1931). Ein Beitrag zur Frage der praktischen Bedeutung einiger Blutgerinnungsfördernder Mittel in der Veterinärchirurgie. [**A Contribution to the Question of the practical Significance of some Blood Coagulants in Veterinary Surgery**].—*Prag. Arch. f. Tiermed.* **11**, 64-77 and 89-96. [29 refs.]

This discussion on the knowledge of hæmostasis deals with the subject chiefly from a surgical aspect. The author gives some account of the literature on the coagulation of blood and of the results of certain experiments he carried out. Experiments were performed on a number of healthy horses and dogs in order to ascertain if the intravenous injection of certain substances can shorten the time required for blood to coagulate; each animal was used once only in order to eliminate the possible error of a second test being influenced by the after-effects of the first injection.

As a basis for this work, the normal blood coagulation rate of each animal was first ascertained by the BÜRKER method. The following substances which were considered to possess coagulating properties were injected intravenously into the test animals, the coagulation rate of freshly-drawn blood being tested at intervals :—

CONGO RED.—Amounts varying from 0.1 to 0.3 g. of a 2 per cent. solution were given to seven dogs; the time required for coagulation was not shortened. One dog died of shock two hours after the injection, but the rest did not show any disturbance in health. A similar result was obtained with seven horses which

were given doses of from 2 to 10 g. Another horse dosed with 20 g. showed accelerated pulse and respiration ratio soon after the injection, but these were again normal after one hour.

SODIUM CHLORIDE.—Ten horses were given from 5 to 150 g. of common salt; the coagulation time was shortened in those which received doses of 100 g. and over, but was unaffected in those which received less than 100 g.

CALCIUM CHLORIDE.—Six horses were given doses of from 15 to 80 g. In three which received more than 25 g., there was a slight increase in the coagulation rate directly after the injection. A dose of 80 g. caused syncope with sudden death during systole and only a small amount of blood ran out of the cervical blood-vessels when they were severed immediately after death.

CALCIUM LACTATE.—Seven horses were given doses of from 8 to 70 g.: only doses of 50 g. and over caused any increase in the coagulation rate. Both calcium lactate and calcium chloride caused an acceleration of the pulse and respiration rates, as well as cardiac arrhythmia about one hour after the injection.

BLOOD.—Blood taken from healthy horses and injected in doses of 300 to 1,500 c.c. into four different test horses had no effect on the coagulation rate of blood subsequently drawn.

KOAGULEN.—This is a proprietary preparation and consists of an extract of blood platelets; it was given in normal saline solution to six dogs in doses of 0.2 to 2.5 g. and in no case was there any appreciable increase in the coagulation rate of their blood.

In an investigation into the rate at which blood drops from a hollow needle of convenient size (No. 14 for horses) inserted into the lumen of a vein (calculated by the number of drops of blood per fixed period and by the duration of the blood flow), Smetz found that marked differences exist between various horses of different size and breed, but he gives no comparative information concerning the blood pressure of these animals at the time.

The number of drops of blood that fell from a needle inserted into the jugular veins of horses was observed before and after some of the above-mentioned substances had been injected. In most cases the drip rate following the injections was unaltered. After the injection of 0.08 to 0.14 g. of Witte's peptone per kg. bodyweight, blood flowed for a longer period, i.e. the coagulation of the blood was slowed.

This work has only tended to show that, as far as practical hæmostasis is concerned, no suitable substance is known which can arrest hæmorrhage by causing coagulation of the blood.

J. E.

SZIDAT, L., & WIGAND, R. (1931). Ueber Fuadinwirkung bei Bilharziella-Enten. [The Action of Fuadin on Bilharziella in Ducks].—*Arch. Schiffs- u. Tropen-hyg.* 35. 159-171. 5 figs. 6 tables. [7 refs.]

This paper gives an account of further work on the biology of *Bilharziella polonica* in ducks and describes some experimental treatments of infested ducks with fuadin and emetin.

The life history of this blood fluke differs only in detail from that of the blood flukes of men. The eggs, which are laid by the females in the mesenteric veins, are club-shaped and up to $\frac{1}{2}$ mm. long; they are passively moved through the tissues after the manner of foreign bodies and finally reach the intestine, leaving the body with the fæces. The adaptation of the parasite to its host appears to be more perfect than is the case with blood flukes of man, the pathological changes resulting from a heavy infestation being only slight.

On account of the large size of the eggs, the uterus of the female can only carry one at a time ; they are consequently produced slowly and, even in heavily infected ducks, the fæces contain few. An interesting observation was made on the seasonal production of the eggs. It was noticed that they disappeared seasonally from the fæces of infected ducks and at first it was thought that this might be explained by the short life of the worm. *Post-mortem* examination revealed the presence of both males and females in an apparently normal condition with the exception that the uteri of the female worms contained no eggs. The authors think it possible that the worms live for several years, but that egg production is in abeyance during the winter months and possibly in the mid-summer months also.

The experimental infection of young ducks was found to be a simple matter ; penetration of the skin is the principal mode of entry, and maturity is reached in three weeks.

In the therapeutical experiments three infected ducks were treated with fuadin, each receiving 10 injections in 10 or 11 days, the doses being 0.4 c.c., 0.5 c.c. and 0.7 c.c. per kg. respectively. The large dose, which is ten times as great as that used in man, was well tolerated by the ducks, but had no action on the worms ; the 68 worms which were recovered on *post-mortem* examination, a short time after the last dose, were alive and apparently uninjured by the drug.

Three other infected ducks were treated with emetin : one received a dose of 12 mg. per kg. on two successive days, and two received 12 mg. per kg. on four successive days. Violent vomiting movements followed dosing and the two ducks which received the larger dose showed fatty degeneration of the liver on *post-mortem* examination. In spite of the large doses, however, the 44 worms which were afterwards recovered were alive and apparently uninjured. It is concluded that the duck infected with *Bilharziella polonica* is not a good subject for the testing of drugs for schistosomiasis in man.

During the course of the work the authors made a study of the blood to find out whether any change resulted from infection. As the blood of the duck does not appear to have been studied previously, they first examined normal ducks before proceeding to the examination of those infected with flukes. Six tables are given which show the mean and the extremes of the various counts ; no essential change resulting from the worm infestation was, however, observed, the slight increase of eosinophiles and monocytes being thought of little significance.

E. L. TAYLOR.

ZSCHUCKE, J. (1931). Therapeutische Versuche mit einer Simultanbehandlungsmittels Tetrachlorkohlenstoff und Ascaridol. [*Anthelmintic Tests with a Mixture of Carbon Tetrachloride and Ascaridol*].—*Arch. Schiffs- u. Tropen-hyg.* 35. 138-145. 1 table. [29 refs.]

This paper gives an account of further trials on the human subject with a mixture of carbon tetrachloride and oil of chenopodium or ascaridol for the removal of hookworms, ascaris and trichuris. In mentioning the advantages of the use of this mixture over that of the pure drugs, the author points out that, since the toxic actions of carbon tetrachloride and oil of chenopodium are so different (one acting on the liver and the other on the central nervous system), they do not enhance each other's toxicity when mixed and, as the dose of each drug may be lessened when they are given together, the risk of any untoward result is diminished. Another advantage of the mixture is that the addition of

oil of chenopodium, while in no way lessening the effect of the treatment upon hookworms, greatly increases its effect upon ascaris.

The carbon tetrachloride used in these experiments was a special preparation of that drug produced under the name "seretin." This may be obtained in the usual gelatine capsule form, and also in the form of an emulsion. The advantages of the emulsion are several. On account of its greater bulk the dose can be more easily and more accurately measured. In this form, the drug appears to be less toxic; the author states that sheep and cattle can withstand much larger doses of carbon tetrachloride when emulsified than when given as a simple liquid. The anthelmintic effect is increased; as an example, the author states that fascioliasis in sheep and cattle can be cured by one dose only, whereas, when the liquid carbon tetrachloride is used, two or more doses are required. [It is the general opinion that a single dose of the pure drug is adequate.] The keeping qualities of the carbon tetrachloride are also greatly improved.

In the author's experiments on sleeping sickness patients at Santa Isabel, a dose of 0.6 g. of "seretin" and 0.01 g. of ascaridol per kg. body weight was employed. In a series of 32 trials for the removal of hookworms, the mixture was found to have an efficiency of 99.2 per cent. and, in 28 trials in which observations were made on the reduction in the egg count, a 99.2 per cent. reduction was noted. In a series of nine trials for the removal of ascaris, it was found to be 95 per cent. efficient and, in nine others, to reduce the egg count by 99.5 per cent.

In conclusion, a table is given presenting these results together with those reported at various times by ten other workers who have employed a mixture of carbon tetrachloride with oil of chenopodium or ascaridol; all testify to its potent anthelmintic action.

E. L. TAYLOR.

ARENDSEE. (1932). Vigantol für Tiere und seine Anwendung in der Praxis, insbesondere bei der Aufzucht und Haltung von exotischen Tieren. [Vigantol for Animals and its Use in Practice, especially in the Rearing and Maintenance of Tropical Animals].—*Deuts. tierärztl. Wschr.* 40. 21-23.

The author, who is veterinary surgeon to the Berlin Zoological Gardens, emphasises the value of vitamin D therapy in the form of "vigantol" (made by the firm Bayer-Meister-Lucius, Leverkusen). Young animals from the tropics such as are kept in zoological gardens are very liable to rickets and the author has used this preparation successfully as an antirachitic on numerous species of both wild and domesticated animals.

J. E.

CLOSS, K. (1931). The Iodine Content of Commercial desiccated anterior pituitary Preparations.—*J. Pharmacol.* 43. 131-138. 2 tables. [20 refs.]

The iodine content of a number of desiccated preparations of anterior pituitary was examined by a micro-method described in detail in the text. All the preparations, including a non-commercial sample obtained from fresh cattle glands, contained iodine, usually in amounts varying from 0.08 to 0.19 mg. iodine per 100 g. dried anterior pituitary powder. Preparations of one commercial manufacturer showed a much higher and more variable content of iodine (1.98 to 9.96 mg. per 100 g. dried tissue), a fact which may have been due to the method of preparation.

W. R. WOOLDRIDGE.

- ALLEN, P. W., & JACOB, M. (1930). **Sodium Acid Sulphate as a Disinfectant against *Salmonella pullorum* in Poultry-Yard Soils. A Preliminary Study.**—*Univ. Tenn. Agric. Expt. Sta. Knoxville. Tenn. Bull.* 143. 14 pp.

The authors have investigated the persistence of *S. pullorum* in different types of soil and have tested the value of a number of disinfectants when applied to infected ground. The substance which proved to be the most economic and efficacious was sodium acid sulphate applied as a 5 per cent. solution at the rate of one gallon per square foot. It was not detrimental to the growth of Italian rye grass and the experimental poultry were protected from *S. pullorum* infection. It is an irritating corrodant and must therefore be kept and mixed in wooden vessels and handled with care.

NORMAN HOLE.

- AGUILAR, R. H. (1932). **Deterioration of Hypochlorites.**—*Philippine J. Sci.* 47. 235-243. 3 text figs., 2 tables. [7 refs.]

Samples of chlorinated lime stored in asphaltum lined wooden cases deteriorate somewhat more rapidly under Philippine conditions (average temperature 29° C.) than samples kept in tightly stoppered amber vials. After 12 to 14 months in each case, the available chlorine, which falls more rapidly at first, is reduced to less than 1 per cent. from an original strength of 29.5 per cent.

Similar results obtain with solutions of sodium hypochlorite, commercial samples deteriorating more rapidly than chemically pure preparations.

The chief governing factor appears to be temperature, since the loss of available chlorine is comparatively small when stored in the refrigerator at 8° to 12° C.

G. D. LANDER.

PHYSIOLOGY.

- DE KOCK, G. W. (1931). **Studies on the Blood of Mice.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust. Union of S. Africa.* Part II. pp. 573-615. 10 tables, 5 charts, and 2 appendices. [10 refs.] Pretoria: Govt. Printer.

This is a detailed paper of a study of the blood of mice of the Rockefeller Institute, New York. Different strains of mice, e.g. Rockefeller and Swiss, were utilised to determine the influence of diet, habitat, etc., in respect of resistance to disease.

The author's average figures for the numbers of the blood corpuscles were erythrocytes 10,000,000, per c.mm., leucocytes (much variation was encountered) 1,400 to 39,000 per c.mm., (in the blood from the tail 11,000 to 18,000 and in the case of blood from the aorta 2,000 to 4,000); the differential counts were more uniform—lymphocytes 70 to 80 per cent.; monocytes 1 to 8 per cent.; neutrophils 15 to 20 per cent.; eosinophiles 1 to 4 per cent.; basophiles 1 per cent. These results are discussed and compared with the findings of other workers. The morphology of the leucocytes studied by fixed and supra-vital preparations and in culture is similarly discussed.

J. R. M. INNES.

- MACKAY, W. (1931). **The Blood Platelet; its Clinical Significance.**—*Quart. J. Med.* 24. 285-328. [226 refs.]

This paper is a very complete review of the available literature dealing with blood platelets, in conjunction with the examination of the blood of 6 healthy people and 74 patients. Blood platelets are discussed in relation to the following:—

coagulation time, morphology in health and disease, origin, destruction and viability, numerical variation in health and disease, causes of variation in disease, *purpura hæmorrhagica*, coagulation, thrombosis, clot retraction and anaphylaxis.

The blood platelet is present in human blood as a definite morphological entity, it is non-nucleated, round or oval, having a diameter of 2 to 3 microns. The cytoplasm is hyaline and contains numerous granules. It has its independent origin in the bone marrow and probably arises from the megakaryocyte. Effete platelets are destroyed in the spleen by the cells of the reticulo-endothelial system. In health, the number varies from 250,000 to 400,000 per c.mm. and, in disease, the number may vary within wide limits. Loss of blood is followed by an increase in the platelet count; this also occurs after splenectomy. The number of platelets is no guide to the rapidity of coagulation. Increase of platelets does not induce thrombosis, nor are they responsible for anaphylactic phenomena.

J. R. M. INNES.

CARLETON, H. M. (1931). **Studies on Epithelial Phagocytosis. I.**—*Proc. Roy. Soc. B.* **108**. 1-10. 8 figs. on 2 plates. [16 refs.]

This paper shows that the epithelium of the upper segment of the rabbit's vagina is phagocytic. The following substances were utilised, "hydrokollag" (colloidal suspension of graphite), carmine, cocoa butter and live and dead bacteria (*Staphylococcus aureus* and tubercle bacilli). The various suspensions were injected *per vaginam* and also, subsequent to laparotomy, into the uterine horns.

It was shown that the vaginal epithelium was phagocytic, limited to the non-ciliated cells. [In the rabbit's vagina the epithelium in the upper part is columnar and not stratified; in the cervical region there are ciliated and non-ciliated columnar cells, the latter predominating]: carmine, staphylococci and "hydrokollag" were taken up by these cells, but no definite instance of epithelial phagocytosis by the uterine cells was recorded. On the other hand, fats, such as cocoa butter, were taken up both by the uterine and by the vaginal epithelia, but this was probably an absorption phenomenon and not phagocytosis.

The author stresses the need for stringent criteria in defining phagocytosis and describes the criteria he employed:—(1) the ability to bring the same focal plane to bear on some portion of the nucleus and suspected ingested matter, and (2) to identify the cell membrane as being outside the ingested material.

A provisional explanation is given of the mechanism whereby fixed epithelial cells can actively engulf foreign bodies. There is some reason to believe that the free border of the cell is sticky and that blunt pseudopodia might be emitted. The presence of intra-cellular matter close to the nucleus could only be explained by assuming that the cytoplasm of the epithelial cell is motile.

J. R. M. INNES.

POISSON, H., & BOURDIN. (1931). Néoformation osseuse de nature métaplasique chez le porc. [**Metaplastic new Growth of Bone in the Pig**].—*Bull. Soc. Path. exot.* **24**. 619-620.

POSTL, E., & SCHOUPPE, K. (1931). Ueber einige Sarkomfälle bei Pferden und Hunden. [**Some cases of Sarcoma in Horses and Dogs**].—*Münch. tierärztl. Wschr.* **82**. 589-592. 7 figs.

FERGUSON, T. H. (1931). **New Growths in the Sinuses of Cattle.**—*Vet. Med.* **26**. 488.

The first paper is a brief note on a new growth of bone found in the abdominal wall of a pig. Similar new growths of bone are often found in many different

tissues and have been classified generally as osteomata. The authors, however, consider that the growth which they observed, and many others of a similar nature, arise from a direct transformation of one cellular type of tissue (e.g. connective or muscular) to another (bone) without any intermediate stage or hyperplasia. They are thus not true neoplasms (osteomata), but are examples of metaplasia. Traumatism is probably an exciting factor. [That many of the so-called osteomata in man and animals are not neoplastic, but are metaplastic in nature, has long been realised. This is discussed in detail by EWING (1928) "Neoplastic Diseases." Philadelphia and London: Saunders].

The second paper is a report of twelve cases of sarcoma in horses and dogs. The authors consider that genuine warts hardly ever occur, that fibromata are not excessively frequent and that the majority of skin tumours in these animals are sarcomata, carcinomata and other tumours. Metastases were never observed in the regional lymph glands or internal organs of horses in which malignant skin tumours were found.

The cases are described separately with a brief mention of the histological appearances. The tumours encountered were melanosarcoma, fibrosarcoma, spindle-cell sarcoma and alveolar sarcoma.

The third paper is a very brief summary of a lecture by the author and deals with the clinical aspects of this condition in cattle. The symptoms, diagnosis and treatment are briefly dealt with, but no mention is made of the pathology or of the types of growths which were encountered in this situation.

J. R. M. INNES.

BARCROFT, J., BENATT, A., GREESON, C. E., & NISIMARU, Y. (1931). **The Rate of Blood Flow through Cyanosed Skin.**—*J. Physiol.* **73**. 344-348. 2 figs. [2 refs.]

BARCROFT, J., NISIMARU, Y., & RAY, G. B. (1932). **Observations on the Time taken for Corpuscles to traverse the Liver.**—*Ibid.* **74**. 44-48. 2 figs. [7 refs.]

The sub-papillary venous plexus has been considered as a "blood depôt." The authors of the first paper, however, state that to have such a function an organ must clearly contain important quantities of blood which are, at least temporarily, unnecessary for its own metabolism and which can be transferred to other organs to meet their needs. An organ may have a more copious blood supply than is required for its own needs, with a large vascular bed and very open arterioles through which blood in profusion courses rapidly. Constriction of the arterioles of such an organ would automatically allow its copious content of blood to drain into the venous system and other parts of the general circulation, while the organ itself would be left bloodless or pallid. The opposite conception would be that of an organ which could hold an equal quantity of blood, but in a stagnant condition, as in sinuses or diverticula from the main blood stream. When such an organ is charged with blood, what length of time does a corpuscle take in passing from the artery which supplies it to the vein which leaves it? Towards answering this question as far as the skin is concerned the first paper is a contribution.

The percentage saturation of hæmoglobin with carbon monoxide of the blood from two hands was determined and compared, one hand being cyanosed and the other being flushed by immersion in warm water. Samples of blood were then taken at various intervals after inhalation of carbon monoxide.

The saturation of the blood from the uncyanosed hand nine minutes after inhalation of carbon monoxide was called 100 and the other saturations were expressed in percentage of this standard. After a considerable quantity had been inhaled rapidly, the blood in the uncyanosed hand did not reach its maximum content of carbon monoxide for some minutes—usually more than 4 and not more than 9. In the same circumstances the curve for the carbon monoxide content in the cutaneous blood of the cyanosed hand lagged behind that of the uncyanosed hand. The rise on the curve was slower, the summit which was produced later was not so high and the descent was postponed. This lag seemed to be of the order of 10 minutes and indicated that a considerable number of corpuscles must have tarried in the vessels of the cyanosed skin for at least that length of time.

Other authors have suggested that the liver can also act as a store of blood. MAUTNER and PICK (1929) showed the presence of a sphincter in the hepatic vein which was constricted by histamine; its relaxation allowed the blood from the liver to drain into the general circulation; POULSSON and DALE (1931) showed that the sphincter relaxation was due to adrenaline; GRAB, JANSSEN and REIN (1929) showed that adrenaline injection produced an immediate expulsion of blood from the organ. The question naturally arises is there any store of stagnant blood in the liver such as is contained in the spleen and to a less extent in the cyanosed skin?

A method similar to that used in the first paper was employed on cats and dogs. A dose of carbon monoxide was injected into the trachea and its appearance and disappearance from the small vessels of the liver were compared with the observations made on blood in the general circulation.

The carboxyhæmoglobin reached its maximum value in the blood both of the femoral artery and the general circulation within 2 minutes of the injection. No difference could be detected in the percentage saturation with carbon monoxide as between the arterial blood and that taken from the scratched surface of the liver. The authors conclude that the time spent by the red blood corpuscle traversing the liver is small in relation to that which may be spent in the spleen or the skin. Although the liver is a store in the sense that it contains large quantities of blood which can be transferred to some other site, it is not a store in the sense that the blood is out of circulation. The above conclusions correspond with the structure of the liver, the spleen and the skin respectively. In the vessels of the liver there are no diverticula from the general current in which blood can lie. The splenic pulp and sub-papillary venous plexus provide situations which are separate from the general stream.

J. R. M. INNES.

SHEEHAN, H. L. (1932). **The Renal Circulation Rate in the Rabbit.**—*J. Physiol.* **74**, 214-220. 1 fig. [8 refs.]

In calculations about the function of the kidneys, it is often necessary to make an assumption as to the probable amount of renal blood flow. The author reviews the figures he obtained from a series of 120 rabbits which, as far as could be determined, appeared to have been little disturbed by the short operative interference. These figures are contrasted with those from other sources.

The mean circulation rate through the left kidney (unexposed), in a series of 50 experiments with dyes, was about 1.4 c.c. per g. per minute. [Many of these experiments were reported previously by SHEEHAN (1931) see this *Bulletin*. **2**, 121.]. Owing to experimental difficulty incurred by the operation of exposing

the right kidney, some vaso-constriction was produced and the mean rate was then 1.9 c.c. per g. per minute. In another group of 70 rabbits, figures were obtained in which the venous flow from the left kidney was directly measured by an improved method [for technique see DUNN, KAY and SHEEHAN (1931). *J. Physiol.* **73**, 371.] ; the mean circulation rate was then 2.0 c.c. per g. per minute.

The author concludes that the rate is variable between 1 to 3 c.c. per g. per minute, sometimes being as high as 6 c.c. ; the mean rate is 2.0 c.c.

J. R. M. INNES.

WINTON, F. R. (1931). **The Control of the Glomerular Pressure by Vascular Changes within the Isolated Mammalian Kidney, demonstrated by the Actions of Adrenaline.**—*J. Physiol.* **73**, 151-162. 3 figs., 2 tables. [12 refs.]

The glomerular pressure of the kidney may be affected by (1) variation of the blood pressure external to the kidney in the renal artery or vein, and (2) an internal redistribution of the resistance to the blood flow through the kidney as between the *vasa afferentia* and *vasa efferentia*. Other workers have observed that small doses of adrenaline act on the latter mechanism.

The experiments were designed by the author to discover whether an increase of glomerular pressure due to adrenaline would be accompanied by diuresis even if the pressure in the renal artery remained unchanged and, if so, to analyse the vascular changes in the kidney to which it might be attributed, with a view to measuring the magnitude of the internal control of the glomerular pressure in the kidney.

The reactions of the isolated mammalian kidney at constant arterial pressure to adrenaline depend on the concentration. Low concentrations (about 1 in 2×10^7) induce diuresis and slowing of the blood flow ; higher concentrations reduce or abolish the urine flow and diminish the blood flow further. If in a pair of similar kidneys, perfused with blood from the same circulation, the venous pressure of one is raised and the ureteral pressure of the other adjusted so that the urine flows are equally reduced in the two organs, the diuretic action of adrenaline is greater on the kidney with ureteral obstruction. Reasons are given for inferring that adrenaline increases the glomerular pressure and has no detectable action on the tubular activity. At constant arterial pressure, the glomerular pressure is increased by low concentrations and reduced by high concentrations of adrenaline. The quantitative relations between the concurrent changes in the glomerular pressure and the blood flow through the kidney show that the increase of glomerular pressure is due to dilatation of the *vasa afferentia* and constriction of the *vasa efferentia*. Reduction of the glomerular pressure due to large concentrations of adrenaline is accompanied by constriction of both groups of vessels.

J. R. M. INNES.

NIVEN, Janet S. F. (1931). **The Repair *in vitro* of Embryonic Skeletal Rudiments after Experimental Injury.**—*J. Path. Bact.* **34**, 307-324. 18 figs. [9 refs.]

This paper deals with the mechanism of healing in embryonic long bones of the fowl and mouse, as studied by experimental fracture and incision at various stages of development, and with the behaviour of the fragments after cultivation *in vitro*.

In five-day long bone rudiments of the fowl, after the cartilaginous shaft has been cut through, repair occurs by proliferation of the chondroblasts so that

the fragments fuse and no trace of the injury persists. At a very slightly later stage (five and a half day embryos), repair is brought about by (a) rapid increase in the adjoining cartilage matrix, there being no proliferation of the cartilage cells; (b) restoration of the continuity of the surrounding osteogenic tissue and undifferentiated mesenchyme, and (c) frequent ingrowth of osteogenic cells into the gap between the fragments sometimes accompanied by the formation of osteoid tissue. When a five-day embryonic rudiment is cultivated for 24 hours *in vitro* and then incised, the process of repair is essentially similar to that described for five and a half-day rudiments incised before cultivation. During and after repair *in vitro*, development of the rudiments as a whole continues to progress normally. If the rudiments are fractured at a later stage when the formation of bone has begun (femora and tibiae from seven-day fowl embryo), repair is effected, after restoration of the continuity of the osteoblastic layer and fibrous periosteum has occurred, by the deposition of bone between the fragments. Five and a half-day rudiments cultivated for 6 to 9 days before being cut behave similarly to the seven-day rudiments fractured before explantation. At the earliest stage studied (five-day rudiments), the cartilage cells are as little susceptible to injury and as capable of proliferation as the surrounding mesenchyme. Later they are distinctly more vulnerable and no longer show regenerative proliferation.

In general, after fracture of embryonic mouse bones, repair of the cortical bone resembles that seen in the bony rudiments of the embryonic fowl.

J. R. M. INNES.

MILLER, F. W., SWETT, W. W., HARTMAN, C. G., & LEWIS, W. H. (1931). **A Study of Ova from the Fallopian Tubes of Dairy Cows, with a Genital History of the Cows.**—*J. Agric. Res.* **43**. 627-636. 3 tables, 5 figs. on 1 plate. [16 refs.]

A knowledge of the time of ovulation, the time of fertilization, conditions favourable for the latter and the characteristics of the ovum is of vital importance to the biologist, geneticist and cattle breeder. This paper deals with the results of a study of two tubal ova from dairy cows, together with a complete genital history of each animal.

The first cow which had previously had 6 pregnancies from 8 matings was killed 48 hours after mating. The ovum was removed a few hours after death, photographed and fixed for microscopic study. Oestral bleeding had been profuse prior to death and, contrary to the prevailing opinion that this means sterility, the ovum was found to be fertilised.

Another cow which had previously had only 4 pregnancies out of 12 matings was killed 72 hours after mating; ovulation in the animal had not occurred. Each ovary contained large unruptured follicles with thickened walls, signs of advanced atresia.

The third cow was killed 72 hours after mating and a tubal ovum was recovered which had not been fertilised.

The two ova recovered from the first and third cow are described and illustrated. The recovery from a cow of a fertilised egg in the two-cell stage 48 hours after breeding during œstrum indicates that both ovulation and fertilisation may be complete within 48 hours. Evidence that the second cow had not ovulated shows that œstrum may not necessarily be accompanied by ovulation. The recovery of an unfertilised ovum from the third cow shows that ovulation did take place, but that, although the cow was mated to several young bulls known to have active spermatozoa, fertilisation did not occur. Whether failure to conceive

in this case was due to mating at the incorrect time or to some physiological condition unfavourable to fertilisation is not known.

J. R. M. INNES.

MISCELLANEOUS.

WIRTH, D. (1932). Sammelreferat Veterinärmedizin 1930. [**Veterinary Hæmatological Review for 1930**].—*Folia hæmatol.* **46**. 325-331. [88 refs.]

[For the review for 1929 see this *Bulletin*. **2**. 48-49.].

PETRAS and BISCHOFF worked on the hæmoglobin resistance of various animals: the former found that it is very slight in bovine fœtuses and only attains the normal value at one year of age.

FICHTELMANN recommended an enrichment method employing centrifugation and sodium citrate for the examination of leucocytes. Various workers have been busy on normal blood pictures—LEWKOWITSCH and CANHAM studied the bovine blood picture under various physiological conditions and with different diets and found no appreciable variations. JOCKOVITS enumerated the blood platelet count in cattle: other workers examined the normal blood picture of camelidae and of the pig, guinea pig, rabbit, and fowl.

LUV published an extensive work on the chemical and physico-chemical nature of equine blood (Hanover: Schaper).

SZABO studied the erythrocytes and hæmoglobin of fœtal and new-born pigs.

TORGUT, working on enumeration methods for fowl blood, found the method of KOZMA to be the most suitable one. CORDIER tested the resistance of erythrocytes of the fowl, rabbit, guinea pig, sheep, horse, mule and donkey to hypotonic salt solutions. The resistance was greatest in fowls and followed in the above order for the animals named. A 0.9 per cent. salt solution is isotonic for porcine blood.

ZOTT tested the blood cell sedimentation rate in the horse, fowl, pig, cat, dog, rabbit, guinea pig, ox, goat and sheep. The rate was fastest in the horse (63 mm. in 30 minutes) and was progressively slower in order of the species named above (fowl 2 to 2.5 mm. down to 0.25 mm. in the sheep).

Two workers investigated blood groups in the horse and ox respectively. Four papers on the use of the guttadiaphot in veterinary medicine were published. It was concluded that this apparatus is of very little value. COLSON found that, in cattle blood, regeneration after venesection is complete in 4 to 7 days in young animals.

Three papers on equine infectious anæmia are briefly referred to. HART and his co-workers found that anæmia occurred in certain piglets born of sows fed either on an ordinary diet or on iron-poor diet. The administration of iron to piglets cured their anæmia, but had no effect when it was given to the dams instead of to the piglets.

WIRTH described a case of lymphatic leukæmia in a dog, in which the blood picture was severely altered (ratio of red to white blood cells 3:1 with 82.7 per cent. lymphocytes). FOURIE reported a case of lymphatic aleukæmia in a dog.

SCHÖNBERG repeatedly found Gärtner bacteria in bovine lymphomatosis: this is of interest in connection with meat inspection.

CARLSTRÖM's great work on equine hæmoglobinuria is alluded to [see this *Bulletin*. **1**. 234.]. HJÄRRE, another Stockholm worker, published a treatise on

puerperal hæmoglobinuria of cattle. The exact cause is still unknown: an intensive lactation with some dietetic error appears to be involved.

VOLKMAR reported on sweet clover poisoning of cattle, sheep and horses in North America: in this disease the coagulation rate of blood is greatly prolonged. Anæmia and hydræmia with liability to blood extravasation also occur. It is thought that the cause is a fungus, *Aspergillus* or *Penicillium*, affecting the clover.

SCHUBERT observed a marked increase in the time required for coagulation by bovine blood in cattle fed on turnip tops.

Papers on the blood picture in relation to equine tuberculosis, malignant bovine catarrh, foot and mouth disease and chronic bovine pneumonia were published during the year.

J. E.

BEDERKE, O. (1931). Neue Arbeitsformen im Sowjetrussischen Veterinärwesen. [**New Veterinary Activities in the U.S.S.R.**].—*Deuts. tierärztl. Wschr.* **39**. 797-798.

The author describes the Soviet socialistic methods as they affect veterinary work. The veterinary profession is militarised like all other organisations and there is much rivalry between different brigades. Veterinary institutes and individuals are judged by their work and placed on either the red (good) or black (bad) list.

The author points out that scientific work cannot be produced under such a system.

J. E.

— (1931). **The Survey of the Land-Grant Colleges and Universities.**—*Expt. Sta. Rec.* **64**. 301-308.

This is an editorial article based on the report of the U.S. Office of Education on the survey of land-grant colleges and universities. It is described as the most important publication relating to the activities of these institutions which has yet appeared, and consists of two volumes of approximately 1,000 pages each. The enquiry which has resulted in this report extended over a period of three years and cost approximately \$117,000.

In 1926, the executive committee of the Association of Land-Grant Colleges and Universities suggested that the time had arrived when the colleges themselves felt that there should be a national study with a view to determining how well they were fulfilling the purposes for which they were established and what changes or modifications were necessary in order to enable them to meet more effectively the new situations which were arising.

The Federal Bureau of Education assumed entire control of the work and responsibility for the report. A National Advisory Committee was set up consisting of ten members, and additional advisory committees on subject matter were organised for the land-grant college personnel.

An extensive questionnaire asking information on 19 different fields of activity was carefully prepared and submitted to each institution, and ultimately 92 per cent. of these were returned and made use of in the report. The extent of the co-operation ranged "from as low as 76 per cent. for the questions dealing with the arts and sciences to 100 per cent. for engineering and veterinary medicine." Following a preface and historical introduction, the subject is presented under 20

headings, including administrative organization, business management, finance, alumni and former students, staff, library, veterinary medicine, etc.

Despite the valuable annual reports of the Commissioner of Education, the Office of Experiment Stations and numerous other bodies, much information regarding the work and status of the land-grant institutions included in this report has been obtained only through a canvass of the 69 institutions included.

The 52 land-grant institutions admitting white students are shown to have total incomes from all sources for the year 1928 of \$142,182,108, which is an increase of 310 per cent. since 1915. These funds come from various sources such as Federal funds, private gifts, student fees, etc., and 47 per cent. of the total was derived from the States. Yet in spite of this, the report states that "recent re-organizations of State governments, the creation of State budgets, and the extension of the power of State agencies over the finances and internal affairs of the land-grant colleges have in many instances tended to supersede the authority of institutional governing boards and institutional administrative officers." Reference is made to the increased revenues obtained from the students themselves who now supply nearly 11 per cent. of the total income.

Much of the data is on an occupational basis, and a number of tables deal with the earnings and salaries of graduates.

Some suggestions for the improvement of institutional facilities are contained in the section on libraries, and it is stated that they represent "to a large extent a development of the twentieth century"; and that their importance is not yet everywhere fully recognised. The main difficulty in this respect is stated to be insufficient financial support and, to a great extent, this is attributed in many cases to a lack of knowledge on the part of administrators as to what constitutes adequate library facilities.

The section on agriculture deals with the question of objectives. Social, economic, and educational advances require that preparing students for general farming be no longer the primary factor of the land-grant institutions.

The editorial concludes with the statement that "the foregoing references to a few of the topics taken up in the report should not be construed as an attempt at a complete review."

G. W. DUNKIN.

- I. FOLLET-SMITH, R. R. (1930). **Minerals in the Pasture Grasses of British Guiana.**—*Agric. J. Brit. Guiana*. 3. 39-44.
- II. FOLLET-SMITH, R. R. (1930). **The Report of an Investigation of the Soils and of the Mineral Content of Pasture Grasses occurring at Waranama Ranch, Berbice River.**—*Ibid.* 142-159. 5 figs.
- III. DASH, J. S. (1929). **An Agricultural Survey of the Waranama Savannah, Berbice River.**—*Ibid.* 2. 140-141.
- IV. MARTYN, E. B. (1931). **A Botanical Survey of the Rupununi Development Company's Ranch at Waranama, Berbice River.**—*Ibid.* 4. 18-25.
- V. —. (1931). **Notes. An Analysis of Pasture Grasses of the Colony.**—*Ibid.* 43.

The interest of these five papers for veterinarians lies in their relationship to bovine aphosphorosis [see this *Bulletin*. 1. 313., 2. 101 and 2. 168.] and the various diseases caused directly or indirectly through phosphorus deficiency in natural pastures.

Although many of the soils of British Guiana have long been known to be poor in phosphorus [HARRISON, J. B. (1914). "Analytical Examination of

Samples of Soils from the Rupununi Savannah District." Report printed by the Authority of the Governor, Georgetown, Demerara. C.C. No. 714.] it is only recently that attention has been focussed upon the probable effect of mineral deficiencies on the health of grazing stock [see MONTGOMERY, R. E. *infra*.]

I. This paper records the composition of different varieties of pasture grasses occurring in the vicinity of the Government Stock Farm, Georgetown, collected by the Government Veterinary Surgeon and analysed by the Chemist-Ecologist. The samples appeared in most cases to be deficient in calcium, phosphorus and nitrogen. Indeed the figures for "natural savannah grasses" are shown as low as 0.05 per cent. phosphorus pentoxide and 0.16 per cent. calcium oxide, as compared with 0.67 per cent. phosphorus pentoxide and 0.65 per cent. calcium oxide for good British pastures (dry matter basis), i.e. the phosphorus content of part, at least, of the grazing in British Guiana is less than one-tenth that of representative British grasses. The figure for calcium is about a quarter that of British pastures, and only about half that of certain pastures in the Falkland Islands [upon which sheep have been suspected of mineral deficiency disease].

II. This second paper deals with the composition of soil and pasture on the cattle ranch of the Rupununi Development Company at Berbice River. The results show very pronounced deficiency of calcium and phosphorus, and sometimes of other mineral constituents. Indeed one of the individual grasses, *Axonopus attenuatus*, showed the almost incredibly low phosphoric oxide content of 0.01 per cent., probably the lowest figure recorded in the literature of grass analyses [presumably on stems after seed-fall and with few old leaves]. The figure for "available phosphate" in the soil samples frequently lay in the fourth decimal place—down to 0.0003 per cent. in two cases.

In the photographs accompanying this paper, a typical case of osteophagia is shown—an ox, with up-tilted head, chewing a bone picked up from the pasture, in the unmistakable pose now so familiar from the South African and American literature. As in the case of the cheap, arid, phosphorus deficient areas of South Africa, phosphatic manuring is regarded as uneconomic and the most promising solution is the regular feeding of bone meal.

III. This short note by the Director of Agriculture precedes the two just considered, and is of special interest as officially foreshadowing a joint survey of the chief cattle-raising districts by a team consisting of the Government Veterinary Surgeon, the Chemist-Ecologist and the Botanist. [It need hardly be emphasised that such a team is essential for this class of work and that a good deal of the research on mineral deficiency problems in some quarters has suffered from isolated attack from the angle of vision of one science only].

IV. This paper represents a contribution from the botanist. A general description of the ranch is given and the suitability of the area for cattle is discussed. The best vegetation is found in the "pans" or depressed areas. A distinct "plant association" is described from the "Muris" or white sand areas. On the ant hills a definite "plant succession" could be traced, similar to that found in the narrow transition belt between open savannah and the forest areas.

V. In this short note an ash analysis is given of Guatemala grass (*Tripsacum* sp.) forwarded by the Government Veterinary Surgeon from the heavy coast clay of the Government Stock Farm.

The phosphorus pentoxide content of the whole leaves (dry matter basis) is 0.58 per cent. or almost as high as good British pasture. The calcium oxide content, however, is somewhat surprising at only 0.15 per cent., [a prolonged feeding test on cattle restricted to such grass would be of enormous value as

throwing light upon the vexed question as to whether a natural alcalicosis is possible independently of an aphosphorosis—see THEILER, A. this *Bulletin*. 1. 318.].

An ash analysis of wynne grass (*Melinis minutiflora*) growing at the Wauna sub-station is also given. The figures are of special interest because the Wauna soil is typical of large areas of the interior and because the grass concerned spreads so rapidly that some difficulty is experienced in keeping it under control when other crops are being cultivated. The figure for phosphorus pentoxide is 0.26 per cent. and for calcium oxide is 0.48 per cent. Unfortunately the stage of growth is not specified but, such as they are, the figures are above those commonly associated with aphosphorosis in its more extreme forms [see THEILER, A., & GREEN, H. H. "Aphosphorosis in Ruminants." abstracted this *Bulletin*. 2. 391.].

This group of papers as a whole should be of great interest to veterinarians and biochemists concerned with mineral deficiency problems. The wide variation in the figures for the grasses from different localities, and even different patches of the same district, helps to explain the discrepancy commented upon by MONTGOMERY [see *infra*] in regard to the deficiencies shown by chemical analysis and the comparative freedom from specific clinically detectable aphosphorosis [of the type so well known in South Africa as "styfsiekte," in Australia as "cripples," and in Texas as "creeps."]

Two veterinary papers in the same series are reviewed in the succeeding abstract.

H. H. GREEN.

BONE, T. (1930). **Cattle in the Coastal Belt.**—*Agric. J. Brit. Guiana*. 3. 35-38.

BONE, T. (1930). **Investigation of Ranching Problems of the Waranama Savannah, Berbice River.**—*Ibid.* 160-163.

FULTON, A. M. (1930). **Fencing and its Significance in relation to local Live-Stock Problems.**—*Ibid.* 5-9.

The first two of these papers are to some extent veterinary companions to the chemical papers of FOLLET-SMITH and the botanical paper of MARTYN [*supra*].

In the first, it is pointed out that in the coastal belt of British Guiana 50 per cent. of the cattle exist on a maintenance ration only, 25 per cent. obtain sufficient food to enable them to do a little work or yield a small supply of milk and only 25 per cent. are fed up to their potential productive capacity. This means that 50 per cent. are on the border-line between assets and liabilities and only 25 per cent. can be considered profitable.

At a time when the grazing was less restricted it was possible for roaming cattle to maintain fair condition on the pastures, but today the areas are relatively overstocked and unless the system of management is changed the economic prospects are gloomy.

Fences, paddocks, corrals for use at certain seasons, grazing the paddocks in rotation to avoid tramping out, may solve the difficulty of feeding store cattle and dry cows. Improvement of the pasture can be made to increase the production of prime meat animals and milch cows, but deep-milking cows require concentrates which at present are difficult to grow economically.

Attempts to improve the breed of the cattle by importing stock have generally proved disastrous, but unfortunately there are no records to show the causes of death. The land and climate favour stock-raising, but definite action is required to found a profitable cattle industry.

In the second paper, the system of management of the Waranama ranch of the Rupununi Development Company is outlined. As a rule the cattle are transferred from Rupununi to Waranama from October to December and again in April and May, i.e. the ranch is not overstocked and does not provide a continuous sole source of nutrition. This helps to explain why they do fairly well in spite of the mineral deficiency of the grasses. Of special interest is the statement that animals arriving in emaciated condition may pick up on the savannah, but if kept on the ranch again become emaciated and die [explicable if it be assumed that skeletal reserves are sufficient to balance out the phosphorus deficiency of the pasture for a limited period, but that when these are depleted aphosphorosis is manifested in chronic or acute form—in the experimental aphosphorosis of THEILER, GREEN and DU TOIT, see paper XXVIII, this *Bulletin*. 2. 170., year old heifers withstood extreme phosphorus deficiency for over 12 months before manifesting any clinical symptoms].

The author also states, on the authority of the ranch manager, that an earlier attempt to introduce breeding stock failed—100 heifers introduced from Rupununi lost condition and died out.

As beef cattle the conformation of the Rupununi cattle leaves much to be desired [see DU TOIT and BISSCHOP for South Africa, this *Bulletin*. 2. 174.]. Pica is common and there is clinical evidence of phosphorus deficiency.

The author suggests a lick consisting of 3 parts bone meal and 1 part salt, fed in troughs [see BEKKER, J. G. (1931) on methods of supplying phosphorus, discussed on p. 369, "Aphosphorosis of Ruminants" by THEILER, A., & GREEN, H. H. (1932). *Nutrition Absts. & Revs.* 1. 359-385].

The third paper does not deal directly with mineral nutrition, but indirectly the proper fencing off of open savannah into paddocks of suitable size to ensure eating down of grasses without trampling out, bears upon economic utilisation of the pasture. The various obvious advantages of controlling the range of grazing stock are emphasised and the author proclaims the main essentials for grading up of cattle to be "bulls and barbed wire."

H. H. GREEN.

REPORTS.

MONTGOMERY, R. E. (1931). **Report by Adviser on Animal Health to the Secretary of State for the Colonies, on a visit to the West Indies, British Guiana and Bermuda.**—*Colonial Advisory Council of Agriculture and Animal Health*. London: Colonial Office.

The report of a rapid official tour, on the basis of which is presented a broad survey of the various problems in the animal industry of the West Indies, British Guiana and Bermuda. The contents are arranged in seven sections.

Section 1 deals with numbers of stock, ownership and objectives. Population statistics are given in respect to horses, mules, donkeys, cattle, pigs, sheep and goats, and the various purposes for which they are used are discussed. Generally speaking the stock is low grade, but the various local government authorities encourage improvement by maintaining better-class animals for disposal and loan for service.

Section 2 deals with pasture, foodstuffs and water supply. The last named is naturally variable, but in most of the West Indian Islands rainfall is sufficient to ensure steady growth of vegetation. In British Guiana, flooding is common

during the rainy season, but presents no serious obstacle to stock raising. In regard to the natural pastures judgement on the basis of the character and numbers of the stock carried is rendered difficult by alien factors such as indifferent management, poor breeding and considerable parasitisation. On estates certain grasses are cultivated for grazing and cutting, *Panicum maximum* (Guinea grass) and *Panicum barbinode* (Para grass) growing with luxuriance in favourable circumstances. *Sorghum vulgare*, *Pennisetum purpureum* and *Tripsacum laxum* (Guatemala grass) provide supplementary green fodder and ensilage.

The remarks of the author upon mineral deficiencies in the natural pastures are of particular interest, since in certain areas extreme deficiency of phosphorus and calcium are reported [see FOLLET-SMITH, *supra*.] and osteophagia is common without, apparently, being productive of serious disability. Of the Rupununi district the author writes :—

“ It is stated that cattle which are domesticated and able to enjoy the grazing develop normally and put on condition, especially if they possess any imported blood, and that they are able to rear their calves. There is difficulty in reconciling the apparent mineral shortage and the associated pica with this normal development and it is hoped that critical field experiments can be undertaken in the Rupunini as well as elsewhere.”

Section 3 deals with breeding and management of stock. The Government Stock Farms in Jamaica and Trinidad not only perform a useful service as demonstration centres for the exhibition of types and methods of management, but also by their periodical sales enable small owners to gain possession of good acclimatized stock at reasonable cost. The author makes recommendations regarding the establishment of similar farms in other colonies, the interchange of sires for selective breeding, the erection of fencing and construction of dipping tanks for better control of disease, and various other matters in which financial assistance from the local Governments would be advantageous.

Section 4 deals with the disease situation. On the whole, actual mortality from disease is reported as low, but may be higher than officially recognised. Tick fever is important and although there are now over 300 privately owned dipping tanks in Jamaica no definite policy of tick destruction is applied in the case of small owners, with the result that tick life continues as a constant menace in the background. Anthrax and blackquarter are dealt with by inoculation. Tuberculosis is sufficiently widespread to justify greater action in regard to its control. Contagious abortion causes some anxiety and swine fever is probably commoner than is suspected.

A disease of cattle and equines described as botulism occasions some insecurity and a certain mortality amongst human beings is locally regarded as due to the same disease. The author recommends more thorough investigation. [This has since been attributed to rabies occurring in an atypical form, see this *Bulletin*. 1. 285.].

Parasitic infestations are common and in some cases cause serious local mortality.

In presenting the general picture in all the colonies as one in which no serious disease is rife, the author is careful to point out that no proper veterinary survey has yet been possible in any one of them, and that in none of them do adequate facilities exist for diagnosis through routine microscopical and serological procedure. Information obtained from the records of slaughter houses is naturally imperfect, and even dubious when no veterinarian is associated with inspection. But even the recorded diseases become of much greater importance the moment improvement of existing stock is contemplated through importation of high priced stud animals.

The legislation in regard to importation and movement of stock is discussed and improvements in technique of administration are suggested.

Section 5 deals with the present economic uses of animals and animal products. The indigenous cow gives but a few pints daily in excess of the calf's requirement, but animals crossed with milking strains and correctly fed for milk production respond to attention. In regard to meat the general quality in the West Indies is poor, owing to bad breeding and poor management, although there are exceptions, notably in Jamaica. The trade in hides and skins is also reviewed.

Section 6 considers the development of markets and, judging from the quoted statistics of imported dairy produce, the internal market is far from saturated by internal production. The author deals with milk, dairy produce, meat, live stock shipments, frozen and chilled meat, pig products, barrelled meats, other meat products, stock supplies, and manufacturing facilities for conversion of each type of animal into the most saleable series of commodities. On each of these points he offers suggestions for improving existing conditions, and indicates the part which local Governments might play in developing production and marketing.

Section 7 deals with the administration of public health, and makes specific recommendations in regard to the extension of veterinary activities throughout the colonies considered, in respect both to research and administration. The desirability of fostering closer relationship between existing veterinary officers in the West Indies is also emphasised, and the obvious desirability of passing a Veterinary Surgeons Registration Ordinance is pointed out. A proposal for regulation by licence of the importation and sale of biological products used in control of animal diseases, is recommended for consideration [presumably similar to the legislation in force in the Union of South Africa since about 1924].

Taken as a whole the report not only provides a useful survey of the veterinary position in the West Indies, but offers well-balanced constructive suggestions for improving the animal industry of the colonies concerned.

H. H. GREEN.

UNION OF SOUTH AFRICA. (1931). **17th Report of the Director of Veterinary Services and Animal Industry, Onderstepoort.** In two vols. 878 pp. Pretoria : Govt. Printer.

This report deals with original work done by the staff of the Onderstepoort laboratories in the year ending August, 1931. The report, which is divided into sections on an etiological basis, consists of the following articles :—

PROTOZOAL DISEASES.—Immunity in East Coast Fever by P. J. DU TOIT, pp. 3-25 ; Treatment of Piroplasmoses with T.21 by B. S. PARKIN, pp. 27-43 ; Blood Parasites of Game in Zululand by W. O. NEITZ, pp. 45-60 ; Antimony Therapy in *Trypanosoma brucei* Infection of Horses by B. S. PARKIN, pp. 61-65 ; Antimosan Therapy in *Trypanosoma congolense* Infection of Sheep by B. S. PARKIN, pp. 67-76 ; Styrylquinoline No. 314 in Trypanosomiasis by B. S. PARKIN, pp. 77-82 ; A Note on the Diagnosis of Bovine Trypanosomiasis by B. S. PARKIN, pp. 83-86.

VIRUS DISEASES.—Heartwater. The Present State of Our Knowledge of the Disease by R. A. ALEXANDER, pp. 89-150 ; An Attempt to Attenuate the "Virus" of Heartwater by Passage by P. J. DU TOIT and R. A. ALEXANDER, pp. 151-160 ; The Microscopic Diagnosis of Heartwater : A Preliminary Note on the Value of Intima Smears by C. JACKSON, pp. 161-173 ; A Rickettsia-like Organism in the Conjunctiva of Sheep by J. D. W. A. COLES, pp. 175-186 ; An Unknown Intracellular Organism of the Conjunctival Epithelium of Sheep. Preliminary Report by J. D. W. A. COLES, pp. 187-189.

BACTERIOLOGY AND FUNGUS DISEASES.—Black Quarter and Malignant Oedema : A New Method for the Preparation of a Bi-valent Vaccine against *B. chauvoei* and *Vibrio septique* by J. R. SCHEUBER, pp. 193-196 ; *Vibrio foetus* as a Cause of Bovine Abortion in South Africa by P. S. SNYMAN, pp. 197-203 ; Investigations into the Cause and Transmission of Lumpy Wool affecting Merino Sheep and its Treatment by D. G. STEYN, pp. 205-213 ; Actinobacillosis and other Complications in Sheep which may arise from the Feeding of Prickly Pear (*Opuntia* spp.) by A. D. THOMAS, pp. 215-229.

PARASITOLOGY.—Wild Antelopes as Carriers of Nematode Parasites of Domestic Ruminants. Part I by H. O. MÖNNIG, pp. 233-254 ; The Specific Diagnosis of Nematode Infestation in Sheep by H. O. MÖNNIG, pp. 255-264 ; The Development of Nematode Eggs and Larvae in Cattle Dung. Preliminary Note by H. O. MÖNNIG, pp. 267-268 ; A Second Species of the Nematode Genus *Acanthoxyurus* by H. O. MÖNNIG, pp. 269-272 ; Two New Species of the Nematode Genus *Hartertia* by H. O. MÖNNIG, pp. 273-276 ; Two New Nematodes from the Suricat (*Viverridae*) by H. O. MÖNNIG, pp. 277-282 ; New Genera and Species of *Mallophaga* by G. A. H. BEDFORD, pp. 283-297 ; A Study of the Sheep Blow-Flies of South Africa by B. SMIT, pp. 299-421 ; The Toxicity of the Pupae of the Moth *Nudaurelia cytherea* by D. G. STEYN, pp. 423-429.

MINERAL DEFICIENCY AND METABOLISM.—Studies in Mineral Metabolism XIV. Inorganic Phosphorus in the Blood of Pregnant Heifers by A. I. MALAN and J. G. BEKKER, pp. 433-438 ; Studies in Mineral Metabolism XV. Potassium Iodide in Poultry Farming by A. I. MALAN, pp. 439-442 ; Studies in Mineral Metabolism XVI. The Micro-determination of some Inorganic Elements in Blood and Vegetation by A. I. MALAN and G. W. B. v.d. LINGEN, pp. 443-452 ; Studies in Metabolism XVII. Phosphorus in the Nutrition of Sheep (2nd Report) by P. J. DU TOIT, A. I. MALAN and J. W. GROENEWALD, pp. 453-472 ; The Preparation of Cystine by J. G. LOUW, pp. 473-474 ; The Effect of Small Quantities of Nitric Acid on the Colorimetric Determination of Phosphorus by G. W. B. v.d. LINGEN, pp. 475-477 ; The Increase of Inorganic Phosphorus in Blood containing Lithium-Citrate as Anticoagulant by G. W. B. v.d. LINGEN, pp. 479-480 ; The Effects of Sulphur on Merino Sheep by D. G. STEYN, pp. 481-492.

PATHOLOGY.—The Haematology and Pathology of Haemonchosis in Sheep by P. J. J. FOURIE, pp. 495-572 ; Studies on the Blood of Mice by G. DE KOCK, pp. 573-615 ; Studies on the Aetiology of Dunsiekte or Enzootic Liver Disease of Equines in South Africa by G. DE KOCK, P. J. DU TOIT and D. G. STEYN, pp. 617-644 ; The Photosensitising Influence of Haematoporphyrin on Sheep and Goats by J. I. QUIN, pp. 645-659.

SEX PHYSIOLOGY.—The Physiological Changes in the Ovary of the Merino Sheep in South Africa, and Their Practical Application in Breeding by J. QUINLAN and G. S. MARÉ, pp. 663-704.

POISONOUS PLANTS.—Recent Investigations into the Toxicity of Known and Unknown Poisonous Plants in the Union of South Africa by D. G. STEYN, pp. 707-728 ; Investigations into the Cause of Alopecia (Kaalsiekte) in Kids and Lambs by D. G. STEYN, pp. 729-767.

The remaining papers deal with problems of animal industry and anatomical anomalies.

The papers detailed above have appeared or will appear in abstract form in this *Bulletin*.